THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXX. No. 753.] LONDON, OCTOBER 16, 1877. [29TH YEAR.] Price 6d.

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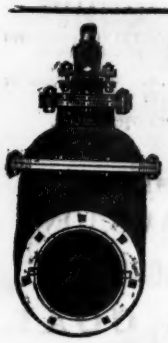

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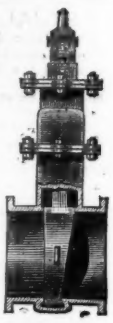

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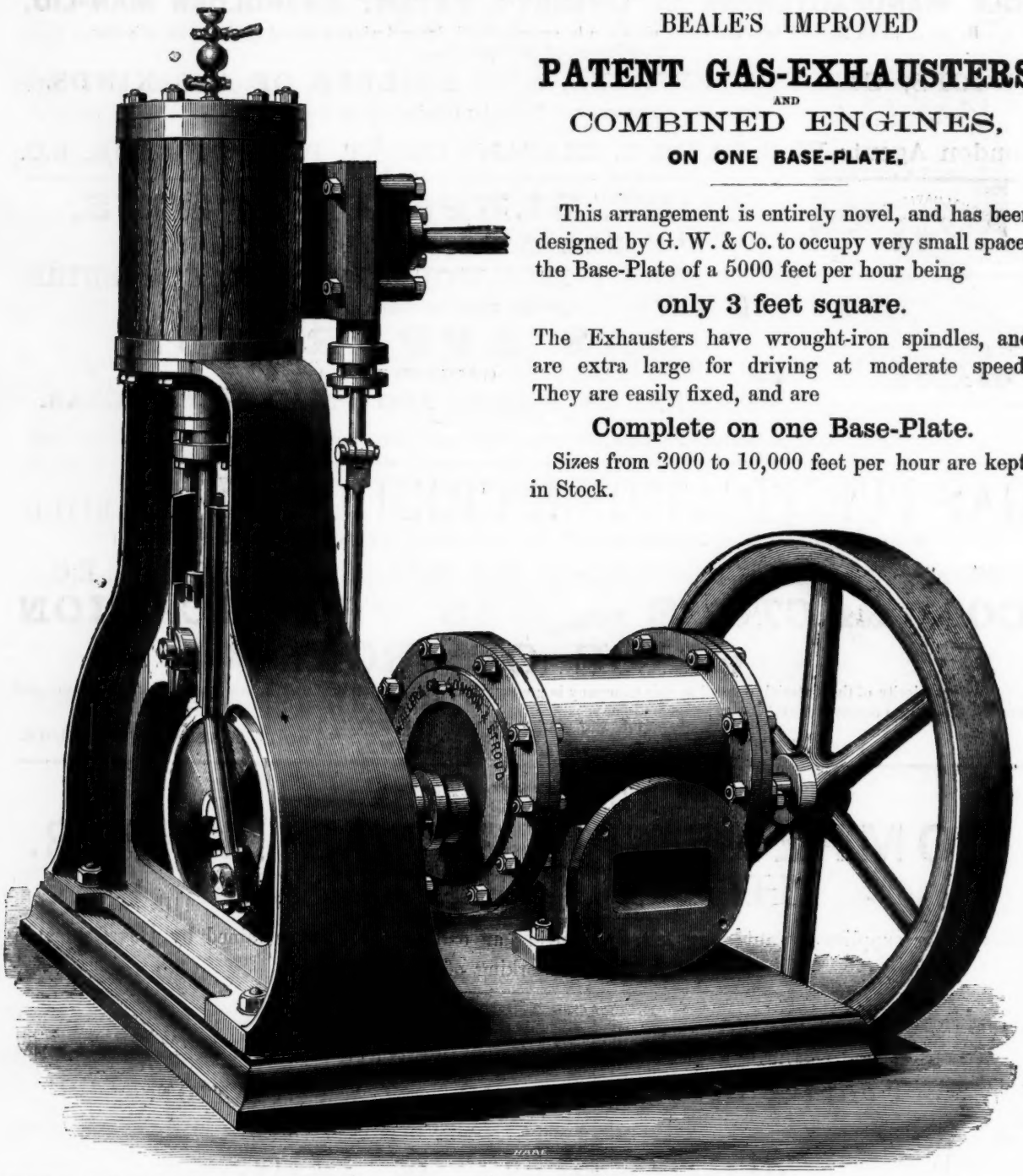

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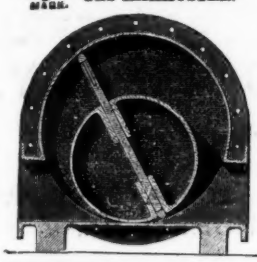

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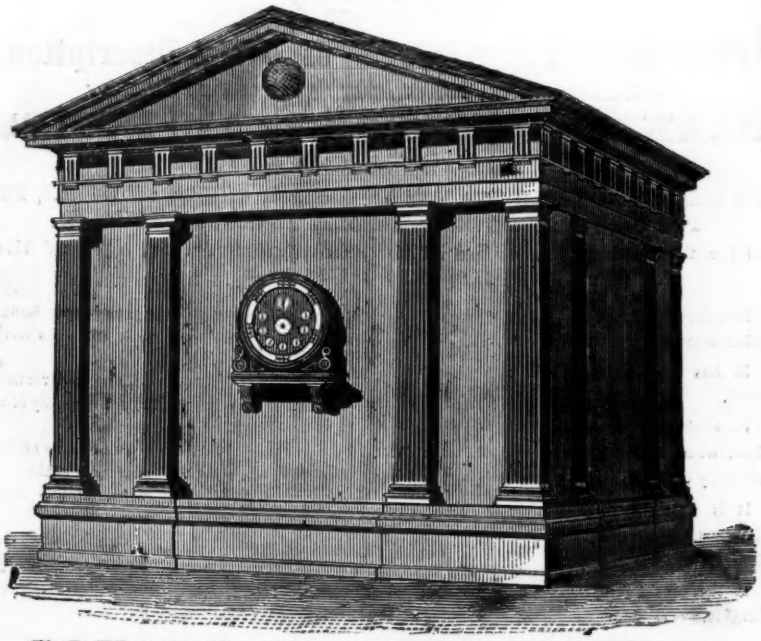

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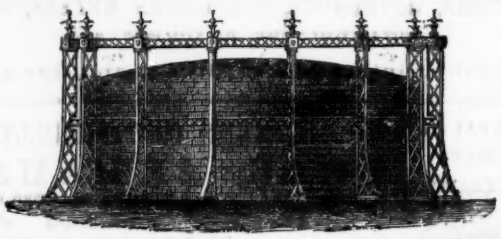

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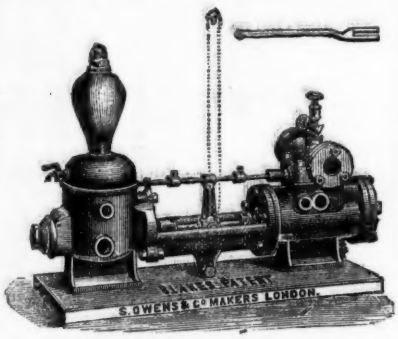
The following are some of the prominent advantages of the BLAKE PUMP:—

It will start at any point of stroke.
It has no dead point.
It works fast or slow, with the same certainty of action.
It is economical. Has a lead on the slide-valve.
It is compact and durable.



It is interchangeable in all its working parts.
It will deliver more water than any other pump.
It is made of best materials in the most workmanlike manner.
Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF
MANN & OWENS
IMPROVED PATENT GAS-VALVES.

PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

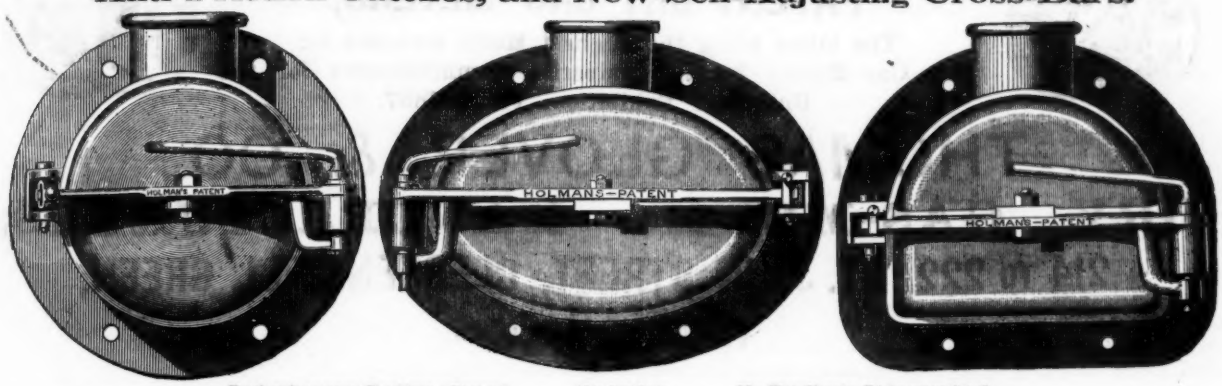
TANGYE BROTHERS AND HOLMAN,

10, LAURENCE POUNTNEY LANE, LONDON, E.C.

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), being now in use in nearly all the principal Gas-Works in London and the Provinces.

Messrs. T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT ITSELF (see Illustrations above), instead of, as heretofore, bringing the Mouthpiece from the D or Oval at back to Circular in front.

D and Oval Morton's Lids have now been working satisfactorily for the past two or three years, both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland).

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

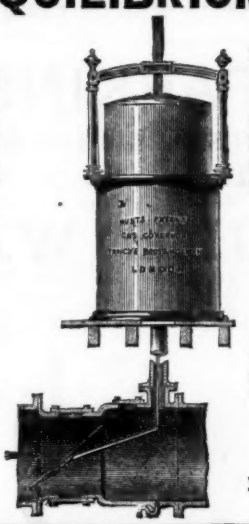
Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.



These Governors have been adopted by many leading Gas Companies, among whom are the following:—

The Gaslight and Coke Co. (9), The London Gas Co. (3), and at Abergavenny, Arundel, Birmingham, Cannes (France), Devonport, Dursley, Exeter, Guernsey, Halesowen, Mentone (France), Monmouth, Newcastle-on-Tyne, Oxford, Plymouth, Rochdale, Windsor, &c.

TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

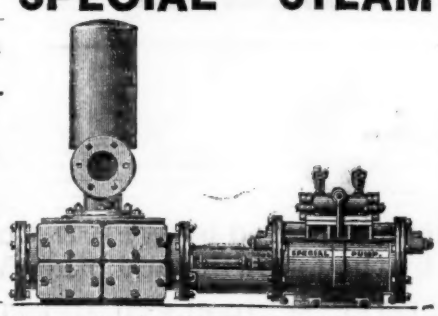
Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,
(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Two Hundred Sizes made. Those in Table opposite are the leading Sizes for use in Gas-Works and Chemical Works.

* These Sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance-piece between steam and pump cylinder, at a small extra cost.

TANGYE'S HIGH-PRESSURE AND CONDENSING STEAM-ENGINES; CORNISH, VERTICAL, & TUBULAR BOILERS; HYDRAULIC AND SCREW LIFTING-JACKS, CRABS, PULLEY-BLOCKS, &c.

FULL PARTICULARS, ESTIMATES, CATALOGUES, ETC., ON APPLICATION.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.

(ESTABLISHED 1816)

ARE THE ONLY MAKERS

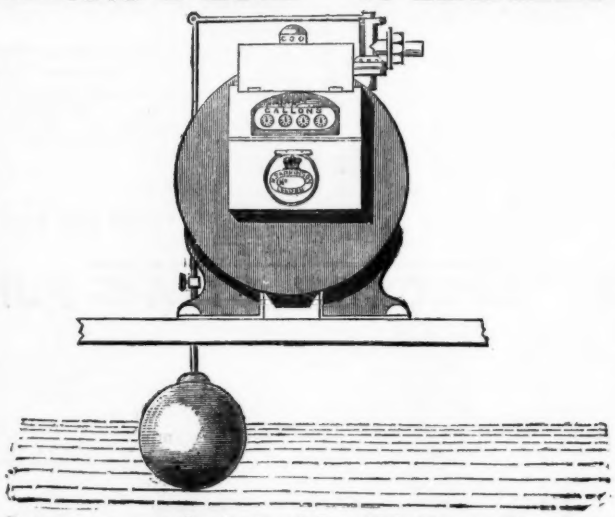
OF THE

LOW-PRESSURE WATER-METER.

These Meters will register with perfect accuracy, either at full speed, or with a few drops only passing through them.

They must be placed over the cistern to be supplied, and the water, after being measured, will fall from the outlet into the cistern below. Each Meter is fitted with a ball-valve, so made that it can be adjusted to shut off the supply at the inlet when the water reaches any required height in the cistern.

The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



From "The Engineer," April 6, 1877.

"Low-pressure Meters have been found to register with almost perfect accuracy, or, at all events, within 5 per cent. either for or against the consumer, and from the nature of their construction are by no means easily deranged. Still, even the low-pressure meters have their disadvantages, but these are chiefly as respects the question of first cost, seeing that they must have a cistern fixed at a higher level than that at which the supply is needed. All things considered, however, the balance of opinion rules at present in favour of the low-pressure Meter, and they are consequently increasing in favour as time goes on."

These Meters have been manufactured by W. P. & Co. for more than 25 years, and are largely used by the following and other Water Companies:—

NOTTINGHAM, DERBY, LEICESTER, SUNDERLAND, GREAT YARMOUTH, SHEFFIELD, NORWICH, LOWESTOFT, COVENTRY, SOUTHEND.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

R. R.—*The seams of the holder should be caulked with thin strips of lead.*
S. E.—*It has been decided that in every Act in which the Gas-Works Clauses Act*, 1847, *is incorporated, the Act of* 1871 *is to be read with it.*
R. K. Moorhouse, Barbadoes.—*Your communication received.*

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, OCTOBER 16, 1877.

Circular to Gas Companies.

It will be seen, by a report in another column, that the Metropolitan Board of Works, at their meeting last Friday, resolved on taking proceedings against the Commercial Gas Company to recover penalties for an excess of ammonia on eight days last month. This is the first instance in which the Board have prosecuted a Company for any alleged default, and may be taken to indicate a new-born zeal for the protection of the public. Ammonia is really the least harmful of what are called impurities in gas. Moreover, it is so much to the interest of a Gas Company to remove ammonia from gas, that we can only regard the large excess reported on one day as the result of accident. The trivial excesses on some other days might well have been overlooked by the Board, and we agree with several members of the Board, that the justice of the case would have been fully met by prosecuting the Company for only the one day's large excess. The Board have, however, decided to claim penalties for each day's default, and the resolution was come to in a manner which deserves serious attention. An amendment, to prosecute for only one day's default, was carried, on a show of hands, by a majority of three. Thereupon a division was called for, and the same amendment was rejected by a majority of one. On the original motion being put, it was, on a show of hands, carried by a majority of one; but when a division was called for, the members present, thirty in number, voted unanimously in its favour. Perhaps such an exhibition of moral cowardice has never before been presented. No inconsiderable portion of our time, for some years, has been devoted to reading the proceedings of Local Authorities, but we never remember to have met with an instance of this kind. The explanation, of course, is that, on a show of hands, the members vote anonymously, but, on a division, their names are recorded, and all desire to appear on the popular side. It may or may not be right that shareholders and others connected with Gas Companies should take part in proceedings such as these, but we are bound to express an opinion that, if they do, it is a moral duty to support, on a division, the vote they have given on a show of hands.

A very interesting discussion took place last week in the Town Council of Halifax, on the bringing up the estimates for the ensuing year. The Gas Committee estimated their profits for the year at £6475. In the course of the discussion which followed the reading of the estimates, an Alderman moved an amendment, which was carried, to the effect that the price should be reduced from 3s. 8d. to 3s. 4d. per thousand feet. The general accounts of the Corporation show an estimated deficiency at the close of the present year of £5682, and it was not disguised that the object of maintaining gas at its present price was to make up this deficiency. The mover of the amendment pointed out that to compel gas consumers to make good the losses of the Corporation was to impose upon them a large amount of indirect taxation; and a Councillor showed that, at the present time, where an ordinary ratepayer contributed 15s. 8d. to the public funds, a gas consumer contributed 17s. 6d. It was also urged that a cheaper supply would increase the consumption of gas in the borough, in which it appears there are still 2500 houses unsupplied with gas. He was met on this point by the assertion that if the demand for gas increased, the Corporation could not supply it. It is evident that the Council have overlooked or forgotten their statutory obligations. If an inhabitant desires a supply of gas, the Corporation are bound, under penalty, to furnish it, and they had better at once set about enlarging their works, so as to be able to give the supply which will probably be wanted. As regards the appropriation of the profits, we may admit that the costs entailed by Lister's fire may very properly be a charge upon the gas undertaking, rather than on the general rates. It is a misfortune, perhaps, that the price of gas now decided upon will not yield sufficient profit to add anything to the renewal-fund, but it seems clear a further expenditure of capital on their works is required. Therefore, their renewal-fund is not of so much importance.

Local Authorities seem sometimes to be queerly advised by their legal officers. The Mitcham and Wimbledon Gas Company recently gave notice to the Wimbledon Local Board that they intended to break up a footpath for the purpose of laying a main underneath it. The Local Board—under advice, we presume—forbade the disturbance of the path; hence a summons to compel the Board to give permission. How any dispute in the matter, in face of the Gas-Works Clauses Act of 1847, could have arisen, we are at a loss to guess. This Act gives a general power to a statutory Gas Company to break up any highway, and disturb any pavement, within their limits, for the purpose of laying a main. Now a footway is as much a part of the highway as a road, and in these days, when steam-rollers and traction-engines bring their unwieldy weights to bear on roadways, crushing gas-pipes in all directions, it is natural that Gas Companies should desire to ensure the permanence of their mains by laying them under footpaths, subjected to a lighter traffic. As a matter of course, the Magistrate decided that the Company should be allowed to open the footpath, care being taken that pedestrians are as little inconvenienced as possible.

The foundation stone of the new gas-works of the Manchester Corporation, at Bradford-cum-Beswick, was laid on Wednesday last, by Alderman Hopkinson. It is estimated the works will cost £800,000. When they are completed the four stations of the Corporation will have a total gas-producing power of 30,000,000 cubic feet per diem, equal to three times the present daily consumption. In another column will be seen an account of the ceremonies and festivities attending the laying of the foundation stone of the new works, and an interesting account of the existing works of the Corporation. In the speeches made on the occasion will also be found a history of the origin and progress of gas lighting under the Public Authority, which will go far to dispel many illusions. The case, as we have repeatedly said, is perfectly *unique*, and it is a mistake to quote the example of Manchester as an illustration of the advantages Corporations may derive in these days from the purchase of gas undertakings. When the first public lamp was lighted in Manchester, the Local Authority were the Police Commissioners, who must be considered to have been far-seeing men. Their first essay in public

lighting was made in 1807, when they lighted a single lamp over the door of the Police Office. Here a *hiatus* in the history takes place, which we may be able to fill up at some future day; but, for the present, we have to pass over ten years, when, in 1817, we find the Police Commissioners purchasing land and erecting small works in Water Street. Originally the works were intended to supply only public lamps within the limits governed by the Police Commissioners; but the expense grew very heavy, and the Commissioners sought relief by making a profit out of the supply of gas to shopkeepers. The charge at that time is said to have been 14s. per thousand cubic feet. In time, well-founded doubts arose as to whether the Local Authority had power to employ their funds for trading purposes, and to remove these the Commissioners, in 1824, applied for, and obtained, a special Act of Parliament to enable them to carry on their undertaking without dispute. This was the first Act that ever conferred trading powers on a local authority. In the same year the site of the present Rochdale Road works, which was then beyond the inhabited district, was acquired, and additional plant was erected; and in 1837 the Commissioners obtained by purchase the private works of Mr. Fernley, which have now been developed into the Gaythorn works. In process of time Manchester obtained a charter, and in 1843 the gas-works which had belonged to the Police Commissioners were transferred to the Corporation. From that day to this the history of the Manchester gas undertaking is one of almost unbroken success. The works have grown progressively with the increase of population and the wants of the community, and in the period 1843–1876 the Gas Committee have transferred no less a sum than £1,060,075 to the Improvement Committee, for public purposes, out of gas profits. We have said, on a former occasion, that most of the public improvements in Manchester may be said to have been done at the expense of the gas consumers, and this is strictly true; but it is to be remembered that the Police Commissioners started the undertaking as a commercial enterprise, and were fairly entitled to the profits of it. It is to be regretted that the Corporation have not since taken a different view of the matter, and desisted from unequally taxing gas consumers. The supply of the out-townships renders the case so peculiar, that there is little to be said against the present mode of appropriating the profits. One thing we have repeatedly remarked, and that is that gas has been far too dear in Manchester; we are, therefore, pleased to see that the Gas Committee have resolved on making a reduction of 4d. per thousand within and without the city limits. This reduction will still leave the Corporation a large profit for public purposes, but the bulk of the profit will come from the outlying districts, which are in no way responsible for the debts of the Corporation. As regards the new works, we need only say that they are most admirably planned for convenience and economy, and, when completed, will constitute the most compact works in the kingdom—Beckton not excepted.

An audacious attempt has been made to scare the Corporation of Birmingham with the apparition of the "electric candle," the immediate application of which, on a large scale, in that borough a local daily paper considers possible. From what sources our contemporary obtained his information we cannot guess. Receiving, as we do, regularly, the American scientific and gas journals, and also all the journals devoted to gas published on the Continent, we are bound to say that we have never heard, nor read, of the extensive applications of the electric light which our contemporary asserts to have been made, and to be still in operation. The information we receive goes to show that wherever the light has been tried it has turned out, more or less, a failure. We do not dispute the possibility of improvements, but we repeat a confident opinion that gas has nothing to fear from competition with the "electric candle."

It will be remembered that towards the end of last year the Lighting Inspector of the Corporation of Dublin reported in favour of reducing the consumption of gas in the public lamps from four to three and a half cubic feet per hour, and also curtailing the hours of lighting. By this arrangement he estimated that the Corporation would save £1700 a year. The Town Council fell in with the suggestion, and the change was ordered to be carried out. On a communication being made to the Company, it was objected by the Secretary that any alteration of existing arrangements would be a violation of the compact entered into by the Corporation when the Company reduced the price to private consumers. It was further very properly pointed out, that reduced consumption necessarily involved diminished light. The arguments of the Secretary appear to have converted the Lighting Inspector, who has recently reported in favour of continuing the present rate of consumption, and Committee No. 1 agree with him. Thereupon a row naturally arises in the Council, and hard words are said, which we do not here repeat. For ourselves, we may say that, instead of reducing the consumption in public lamps, the Corporation should increase it. When the shops are closed—and they are closed very early—Dublin is the most dimly-lighted city in the three kingdoms, and but for the fact that the Corporation are utterly impecunious, we should regard the saving it was proposed to make a paltry matter. It is amusing to hear a prominent member of the Council speculating upon where money to pay the increased account, if present arrangements be continued, is to come from. Is it to be taken from the scavenging fund, or from the macadamizing fund, or from the asphalting account? At the present moment it seems the Corporation owe the Company at least two quarters accounts, and are getting deeper and deeper in debt. A financier of skill and experience is evidently required in the Corporation.

The letter of Dr. Phelps, which we published in our last, induces us to make some remarks on M. Brémond's interesting paper on naphthaline. While admitting that the simple remedy he proposes for the naphthaline difficulty is no doubt effective, we cannot agree with his conclusions that naphthaline is sometimes produced by chemical changes which he supposes to take place in mains and pipes. Naphthaline is, undoubtedly, of pyrogenous origin—that is, it is formed in the retort. This fact is made sufficiently clear by M. Brémond himself. It is found in the tar condensed in the hydraulic main; it is found in larger quantities in that from the condenser proper. When not excessive in amount, the quantity that goes forward is, no doubt, held in vapoury solution by the hydrocarbons, and we take it that the fact that the desiccation of gas prevents the deposition of naphthaline depends upon the circumstance, that the removal of this vapour leaves a larger proportion of the solvent vapours. It is inconceivable to us that the heat set free by the condensation of the aqueous vapours, and that produced by the friction of the gas in the pipes, can be sufficient to bring about chemical reactions which, until now, it has always been supposed require an intense heat for their initiation. The experiments of M. Berthelot are conclusive, we believe, on this point. The hydrocarbons from which naphthaline may be produced are exceedingly stable bodies, and nothing but a very high temperature will suffice for their decomposition. To establish his position, M. Brémond should put a mixture of the vapours of, say, styrolene and benzene, under the same conditions as obtain in the distribution of coal gas, and then carefully watch the result. He would watch, we think, a very long time before he found any naphthaline produced. The causes of the deposition of naphthaline are multifarious; foremost among them is a change of temperature. This accounts for its condensation with the tar. Next, perhaps, comes the influence of shock and friction; elbow joints especially favour its condensation. That it is rapidly deposited in pipes in which gas may be said to lie dormant, is a fact well known to every gas engineer. The reason for this is not very apparent, but it is possible that gas in a state of quiescence may deposit its naphthaline just as water deposits suspended mud.

The remedy which M. Brémond proposes, it will have been seen, is remarkably simple and inexpensive. It is only necessary to dry the gas by passing it through quick lime, which thereby becomes slaked, and is, when any condensed naphthaline has been removed, fit for use in the ordinary purifiers. To prevent the subsequent re-saturation of the gas with aqueous vapour is not so easy a matter. A thin layer of a fixed oil on the water in the gasholder-tank, and the substitution of oil for water in the valves and syphons, would, no doubt, do much to obviate the evil.

That the illuminating power of the gas should be improved when aqueous vapour is removed, is a natural consequence; but there would, of course, be a diminished volume; the diminution, however, would be relatively small, and would scarcely affect the accounts of a Gas Company. The process certainly deserves a trial. The double desiccation proposed—that immediately after the purifiers, and again after the gas leaves the holders—would occasion much trouble; but, if oil were substituted for water in the valves and station-meter, and the water in the tank covered with a layer of some fixed oil, the second desiccation, we think, might be dispensed with. The re-saturation of the gas in the consumers meters we do not regard as of any consequence.

We have to announce the formation of another Association of Gas Managers, which is intended to include the Managers of the Midland Counties, and its seat is naturally the town of Birmingham, where the members will meet quarterly, contemporaneously with the ironmasters of the district. It has been well said that one cannot have too much of a good thing, and we believe the oftener that Gas Managers meet together, and share experience and exchange ideas, the better for them, and the better for our industry. We wish the new Association every success.

Water and Sanitary Notes.

We are given to understand that a Committee of the Metropolitan Board of Works recommended the Board to take steps for the promotion of a Bill to enable them to carry out the scheme of Sir J. Bazalgette and Messrs. Bramwell and Easton. With this was joined the recommendation that the Board should endeavour to buy up the Metropolitan Water Companies. The terms suggested were twenty-five years purchase of the average dividend for the last three years, with a bonus of ten per cent. for compulsory purchase. Many people will think these liberal terms, but they are clearly such as all the Companies could not accept. The Southwark and Vauxhall, for instance, have been under a cloud for the past year or two, and their dividends have been exceptionally low; but their affairs are improving daily, and their next dividend will, no doubt, be higher than that of last year. Speaking generally, however, for all the Companies, we think we may say that the terms will be unanimously rejected, and that if the proposal be embodied in the Bill, the Bill will be strongly contested. It will, of course, be perfectly legitimate for the Board to carry out the high-pressure hard water scheme, if they can obtain the power; but probably if they could succeed in purchasing the Water Companies, we should hear nothing more of that scheme. The report we have referred to was sent back to the Committee for reconsideration, some timid members having withdrawn their signatures to it, and thus we have to wait a time to learn the ultimate decision of the Board.

We publish to-day our abstract of the accounts of the Metropolitan Water Companies for 1876. From this it will be seen that the total share and loan capital paid up was, when the accounts were closed, £11,685,824, and the amount of capital expended, £11,614,184. This gives some idea of what it would cost the Metropolitan Board to buy up the Companies. The average annual dividends, on share and loan capital together, may be roughly estimated at six per cent., which gives a sum of £696,840 per annum. Twenty-five years purchase of this latter sum amounts to £17,331,000, and adding the ten per cent. bonus, we arrive at a total of £18,499,582. We have always estimated the value of the London water undertakings at twenty millions, and we doubt whether they can be bought for less. Supposing the Board, however, to obtain power to acquire the Companies on the terms they propose, and to carry out the new scheme, and this scheme to be completed at the cost estimated by its projectors (£8,000,000), it will be seen that the total cost of waterworks to the Metropolitan Board would be £26,499,582. The annual interest on this sum, if raised at three and a half per cent., will amount to £927,465. When we look at the gross profits made by the Water Companies in the last year, it would seem that there is small chance of the Board gaining much by the double venture. There is little to be said about the individual Companies. The cost of water to the Grand Junction Company, especially the cost of pumping, is exceptionally high, but no doubt a ready explanation of the fact could be given. For the rest, the Companies appear to keep the even tenor of their way, and we hope they will long remain to do so. It will be seen that the supply of water continues to be most liberal, it averages daily 118,435,211 gallons, which gives twenty-nine gallons per head per day to four millions of people.

As we expected would be the case, the Town Council of Leicester have almost unanimously adopted the report of the Gas and Water-Works Purchase Committee, and have ratified the terms agreed upon for the purchase of the water-works. The sanction of the owners and occupiers has yet to be obtained at a town's meeting, held under the provisions of the Municipal Corporations (Borough Funds) Act. Although there are dissentients, and the purchase is opposed by a part of the local press, we have no doubt that the influence of the Council will be sufficient to induce a majority of the ratepayers to support the purchase. The speakers who opposed the purchase did so on several grounds. One argued that commercial undertakings were better managed by Private Companies than by Local Authorities, and this we believe to be an undoubted fact. Others argued that the price agreed upon was exorbitant, which is certainly not a fact. To our minds, the strongest point insisted upon was that the purchase would largely add to the debt of the Corporation. The present debt is £247,000. The purchase of the gas and water undertakings, the cost of the sewerage and floods prevention works, and some town improvements, will, it is estimated, raise the indebtedness of the Corporation to £1,670,000. We must confess that we regard with something like affright the ever increasing debts of our Local Authorities. The Corporation of Leicester may have a hundred years in which to pay off this debt, or they may be restricted to sixty years, but in either case a heavy burden is laid on the shoulders of the next two generations of ratepayers. Present rates amount to 4s. 6d., and it would seem certain that this sum must be added to, at all events for a time. If, however, the Corporation choose to adopt a plan of management which we deprecate, they may soon make their gas and water undertakings profitable, and relieve the rates.

There can be no doubt that the introduction of acid liquids, and particularly of free hydrochloric acid, is injurious to the fabric of sewers. It is certain, too, that acid sewage is of very doubtful value on a sewage farm. We think, then, that the Town Council of Wolverhampton are acting wisely in taking steps to prevent the admixture of galvanizers "pickle" with their sewage. The borough analyst's report presented to the Council shows clearly that the acid liquids may be dealt with on the premises of the manufacturers, with profitable results. Where hydrochloric acid is used, the solution of chloride of iron, when treated with lime, yields oxide of iron and chloride of calcium, the former having a certain marketable value, and the latter being a powerful disinfectant, which may be useful in the sewers. When sulphuric acid is used, the sulphate of iron obtained in "pickling" may be easily recovered by the simple process of evaporation and crystallization. We fear that manufacturers in general do not sufficiently appreciate the value of what are called their waste products. The Rivers Pollution Prevention Act will, however, rouse them into action, and we hope that in a few years there will be no such thing as avoidable waste.

The proposal of the Manchester Corporation to convert Thirlmere Lake into a reservoir, has brought Mr. Ruskin down upon them. The arguments he uses against the scheme of the Corporation may be readily guessed. He loves natural scenery, and hates Utilitarianism in any shape. He would have no railways in the Lake district; he still more strongly objects to the artificial character which will be given to Thirlmere Lake when an embankment, forty feet high, has doubled its area and obliterated the beauty of its present banks. Time, however, heals all; and in the course of years, no doubt, the banks of the reservoir will be as picturesque as the banks of the present lake. There will, indeed, remain that straight road, which, in Mr. Ruskin's eyes, must be very unsightly; but, beyond that, we cannot think there will be anything to detract from the beauty of the scenery. Of course, Mr. Ruskin makes light of the necessities of Manchester; he says hard words of her manufacturers, which may be deserved; but any candid man, who will carefully consider the matter, must come to the conclusion that Manchester and its suburbs will presently require a much larger supply of water. The question is, from whence is it to come? It is argued by some that there is a large amount of, what we may call, unappropriated water in South Lancashire. That may be true; but it could only be collected at various points and in small quantities, and the cost of its collection, and the large amount of compensation water which must be provided, would make a scheme of this kind extremely expensive, and, moreover, would prove but a temporary palliation. We think, then, the Corporation are perfectly right in going at once to a source which may be regarded as inexhaustible. The objection that the Corporation go to Thirlmere rather in the character of a Water Company than that of a Sanitary Authority, we think, is ridiculous. The outside districts which they supply must have water, and these districts are not in a position to obtain it for themselves. That any great profit will be made out of the new works, we deem very unlikely. It is far more probable that they will cause a drain on the rates for many years to come. We are writing on the supposition that the scheme will be carried out. A Parliamentary Committee are never influenced by sentiment, and all the objections raised against the scheme are merely sentimental.

We make no excuse for recurring to Dr. Richardson's address at Leamington on communicable diseases. If it be clearly established that such diseases may have their origin in morbid actions within the patient's body, and need not necessarily be introduced from without, important consequences will follow. It has always been, to our minds, inconceivable that every case of infectious disease must have been derived from what we may call a parent case, just as all men are said to have descended from Adam. The conditions which produced the first case, whether internal or external, must be capable of repetition any number of times. The view of the possible origin of communicable disease now propounded need not, however, diminish the ardour of sanitary reformers. If it do shake our faith in the possibility of completely extinguishing what are called preventable diseases, our plain duty is to bring about all the conditions necessary for the existence of a healthy human organism, and towards this the efforts of all sanitarians are now directed. We have to drain, and we have to ventilate and to cleanse; but when all this has

been done, it is now deemed possible that some unlucky individual may originate a pestilence if he be not promptly isolated. Legislative enactments to ensure such isolation would, above all things, be necessary, should Dr. Richardson's theory turn out to be true. It will, however, require long years of patient observation and painstaking inquiry for any certain conclusion to be come to on the matter. The germ theory is so specious, and so readily explains the origin and spread of what are called zymotic diseases, that it has taken a very firm hold of the public and professional mind. The great objection to it is that, if it were true, disease must be almost universal, for germs are everywhere.

We have alluded to the necessity for isolation, and agree with Mr. R. B. Carter, that every case of infectious disease should be immediately reported to the sanitary authority. We cannot agree with him, however, that a large army of official inspectors should be appointed to hunt out the origin of every case. If the local Medical Officer of Health be not competent to make the inquiry, he should be replaced by one who is. The great bulk of medical practitioners are not, however, yet sufficiently well trained in sanitary work to be trusted with inquiries of this kind; but we must protest against the great increase of Medical Inspectors suggested by Mr. Carter. The inquiry into the case of self-propagating disease, as he points out, should be prompt, and ought to be made by an officer on the spot, who is acquainted with the conditions of the locality, and generally with the circumstances of the inhabitants. Red-tapeism always creates delays, and a report sent to Gwydyr House would probably get an inspector sent down at the end of a fortnight, or perhaps a month.

Mr. Carter was not altogether logical, for, after recommending inspection by the central authority, he spoke strongly in favour of Local Boards being left in perfect independence. We agree with him that Local Self-Government, as it is called, is now a sham; but what would happen if such Boards were emancipated from all central control, we are afraid to guess. It is much to be regretted that utterly incapable men so often find seats on Boards, but it is inevitable; ratepayers will vote for the men who promise to keep down the rates. It is still more to be regretted that party politics, which Mr. Carter calls an unclean idol, so much influence the elections of Local Councils; but we have great faith that, in time, more sensible views will prevail, and, as ignorance is dispersed, the public will learn that improved sanitation means improved health, and, consequently, the saving of money. Ratepayers will then choose representatives who propose a judicious outlay of their funds, rather than those who promise to keep down the expenditure.

The Exeter Water Company have declined the offer of the Town Council, to sell their undertaking at a price to be fixed by a friendly arbitration. It is now understood that the Council will take steps to promote a Bill for the purpose of effecting a compulsory purchase.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXLVII.

Tables of the Discharge of Gas in Cubic Feet per Hour, through Pipes of various Diameters and Lengths, at different Pressures.

By Thomas G. Barlow. Extended by Thos. Newbigging.

(The specific gravity of the gas is taken at ·4, air being 1.)

Twenty-five years ago—viz., in 1852—a series of tables, prepared by the late Mr. T. G. Barlow, were printed in this Journal, giving the discharge of gas in cubic feet per hour through pipes of various diameters and lengths, at different pressures. The great value of these tables to gas engineers and managers has been universally acknowledged. The pressures there given, however, are somewhat limited in their range, and it is generally admitted that the usefulness of the tables would be enhanced if they were extended in that direction. We now propose to do this with a view to their appearance in the "Treatise" in their proper place. In the meantime, we shall devote a page, weekly, to their publication in the Journal.

These tables are calculated according to the formula given by Professor Pole in his valuable article "On the Motion of Fluids in Pipes," which also originally appeared in this Journal in the year 1852, viz.:—

Q = quantity of gas in cubic feet per hour.
l = length of pipe in yards.
d = diameter of pipe in inches.
h = pressure in inches of water.
s = specific gravity of gas, atmospheric air being 1.

$$Q = 1350\, d^2 \sqrt{\frac{h\, d}{s\, l}}$$

—*i.e.*, multiply the pressure in inches of water by the diameter of the pipe, also in inches. Divide the product by the specific gravity of the gas multiplied by the length of the pipe in yards. Extract the square root of the quotient, which root, multiplied by the constant quantity 1350, and the square of the diameter of the pipe in inches, gives the number of cubic feet discharged in one hour.

Example.

It is required to find the number of cubic feet of gas of the specific gravity of ·400, which will be discharged in one hour from a pipe 8 inches in diameter, and 1250 yards in length, under a pressure of 15-10ths, or 1½ inch head of water. Thus—

$$(h\, d) = 8 \times 1{\cdot}5 = 12.$$

$$\left(\sqrt{\frac{h\, d}{s\, l}}\right) = \frac{12}{{\cdot}4 \times 1250} = {\cdot}024, \text{ the square root being} = {\cdot}1549.$$

$$\left(1350\, d^2 \sqrt{\frac{h\, d}{s\, l}}\right) = 1350 \times 64 \times {\cdot}1549 = 13{,}383 \text{ cubic feet} = Q.$$

Diameter of Pipe, 0·5 Inch.

Length in Yards	10.	20.	30.	50.	75.	100.	150.
Quantity delivered with 0·1 inch pressure	37·7	26·7	21·7	16·8	13·8	11·9	9·7
" " 0·2 "	53·4	37·7	30·6	23·8	19·5	16·8	13·8
" " 0·3 "	65·2	46·3	37·7	29·1	23·8	20·7	16·8
" " 0·4 "	75·2	53·3	43·2	33·7	27·5	23·8	19·5
" " 0·5 "	84·3	59·4	48·6	37·4	30·7	26·7	21·7
" " 0·6 "	92·1	65·1	53·3	41·1	33·7	29·0	23·8
" " 0·8 "	106·7	75·4	61·4	47·5	38·8	33·7	27·4
" " 1·0 "	119·1	84·3	68·8	53·3	43·2	37·7	30·8
" " 1·2 "	130·6	92·1	75·2	58·3	47·5	41·1	33·7
" " 1·5 "	146·1	103·2	84·3	65·1	53·3	45·9	37·8
" " 1·8 "	159·9	113·0	92·1	71·5	58·3	50·6	41·1
" " 2·0 "	168·7	119·1	97·2	75·2	61·4	53·3	43·5
" " 2·5 "	188·6	133·3	108·6	84·3	68·8	59·4	48·6

Diameter of Pipe, 0·75 Inch.

Length in Yards	10.	20.	30.	50.	75.	100.	150.
Quantity delivered with 0·1 inch pressure	104·3	73·8	60·0	46·6	37·9	32·9	26·9
" " 0·2 "	147·5	104·3	84·9	65·8	53·7	46·6	37·9
" " 0·3 "	179·9	126·8	104·3	80·9	65·8	57·0	46·6
" " 0·4 "	207·3	146·5	119·9	93·2	75·9	65·8	53·8
" " 0·5 "	232·3	164·0	133·6	103·2	84·2	73·8	60·0
" " 0·6 "	254·3	179·9	146·5	113·9	92·6	79·7	65·3
" " 0·8 "	293·8	207·3	169·3	131·3	107·0	92·6	75·9
" " 1·0 "	328·8	232·3	189·8	146·5	119·9	103·2	84·2
" " 1·2 "	359·9	254·3	207·3	160·9	131·3	113·9	92·6
" " 1·5 "	402·4	284·0	232·3	179·9	146·5	126·8	103·2
" " 1·8 "	441·1	311·3	254·3	192·2	160·9	138·9	113·9
" " 2·0 "	464·7	328·8	268·0	207·3	169·3	146·5	119·9
" " 2·5 "	519·4	367·5	299·9	232·2	189·8	164·0	133·6

Diameter of Pipe, 1 Inch.

Length in Yards	10.	20.	30.	50.	75.	100.	150.
Quantity delivered with 0·1 inch pressure .	214·0	151·0	124·0	95·0	78·0	67·0	55·0
" " 0·2 " .	302·0	214·0	175·0	135·0	110·0	95·0	78·0
" " 0·3 " .	368·5	260·5	214·0	165·0	135·0	117·0	95·0
" " 0·4 " .	426·6	301·0	245·7	190·0	156·0	135·0	110·0
" " 0·5 " .	476·5	337·5	274·0	213·3	172·8	151·0	123·0
" " 0·6 " .	522·4	368·5	301·0	233·5	190·3	164·7	135·0
" " 0·8 " .	603·4	426·6	348·3	270·0	220·0	190·3	155·2
" " 1·0 " .	675·0	476·5	388·8	301·0	245·7	213·3	172·8
" " 1·2 " .	738·4	522·4	426·6	329·4	270 0	233·5	190·3
" " 1·5 " .	826·2	584·5	476·5	368·5	301·0	260·5	213·3
" " 1·8 " .	904·5	639·9	522·4	405·0	329·4	286·2	233·5
" " 2·0 " .	954·4	675·0	550·8	426·6	348·3	301·0	245·7
" " 2·5 " .	1066·5	754·6	615·6	476·5	388·8	337·5	274·0

Diameter of Pipe, 1·25 Inch.

Length in Yards	25.	50.	75.	100.	150.	200.	300.
Quantity delivered with 0·1 inch pressure .	236·0	167·0	137·0	118·0	96·0	84·0	68·0
" " 0·2 " .	333·0	236·0	192·0	167·0	137·0	118·0	96·0
" " 0·3 " .	407·1	289·0	236·0	205·0	167·0	144·0	118·0
" " 0·4 " .	470·3	333·2	272·1	236·0	192·0	167·0	137 0
" " 0·5 " .	527·3	371·2	303·7	263·6	215·1	187·0	152·0
" " 0·6 " .	575·8	407·1	333·2	286·8	235·8	203·9	166·6
" " 0·8 " .	666·5	470·3	383·9	333·2	272·1	235·8	192·3
" " 1·0 " .	744·6	527·3	430·3	371·2	303·7	263.6	215·1
" " 1·2 " .	816·3	575·8	470·3	407·1	333·2	286·8	235·8
" " 1·5 " .	913·3	645·4	527·3	455·6	371·2	322·7	263·6
" " 1·8 " .	999·8	706·4	575·8	499·9	407·1	352·2	286·8
" " 2·0 " .	1054·6	744·6	607·5	527·3	430·3	371·2	303·7
" " 2·5 " .	1179·1	833·2	679·2	588·5	480·9	415·5	339·6

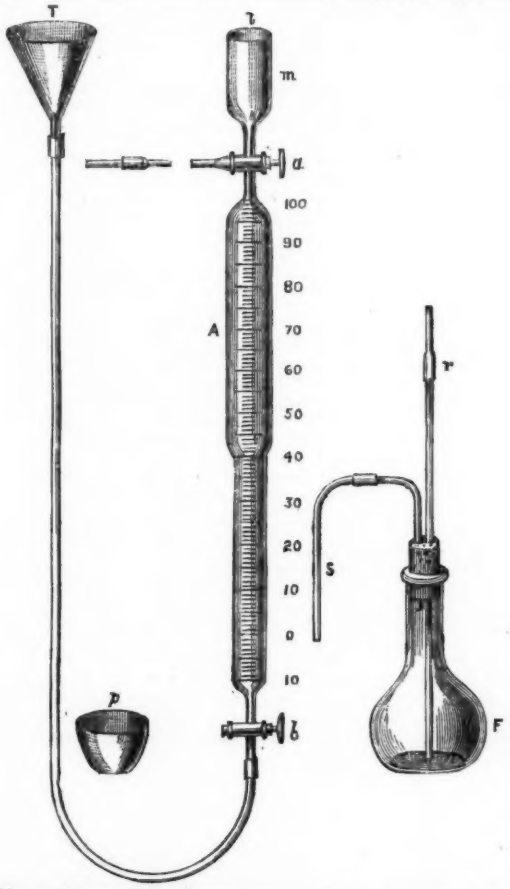
(*To be continued.*)

A SIMPLE GAS BURETTE FOR THE QUANTITATIVE AND QUALITATIVE EXAMINATION OF GAS MIXTURES.

By Dr. H. BUNTE.

[Translated from the *Journal für Gasbeleuchtung.*]

The annexed sketch of a burette for the examination of mixtures of gas is in its general idea similar to an apparatus described by Raoult,* but differs from the commonly employed apparatus of



Winkler and Orsat, by allowing the reagents employed to absorb single constituents of the gas mixture to be quickly and thoroughly removed without loss of gas, so that almost any number of fluid absorbents may be employed successively on the same sample of gas. Moreover, the gas enclosed in the burette can be placed under equal conditions of pressure before and after each absorption by very simple means.

The gas burette, A, consists of a graduated gas-tube, closed above and below by cocks, *a* and *b*, and with a funnel-top, *t*. The space between the cocks *a* and *b* comprises rather over 110 c.c., and is graduated into cubic centimètres and fractions. The division marking 100 c.c. is at the point where the narrow tube, immediately under the cock *a*, widens; the zero point is a few centimètres above the cock *b*. The funnel, *t*, has a mark, *m*, and contains up to that point about 25 c.c. The lower cock, *b*, is a simple perforated stopcock; the construction of the upper cock, *a*, is similar to that in Winkler's apparatus. Besides the transverse aperture, there is also an axial bore entering at the side, and then running parallel with the axis of the cock, by means of which the interior of the burette or of the funnel can be put in communication with the outer atmosphere, or with an india-rubber tube, drawn over the end of cock *a*. As the burette is chiefly used for the examination of combustible gases, in which the non-absorbable portion amounts to at least 60 per cent., the lower part, on which the readings are made, is narrowed to allow of the divisions being wider. The burette is kept in an upright position by means of a spring clamp fastened to an iron stand.

To fill the burette with gas, an india-rubber tube, communicating with the gas pipe is passed over the point of the cock *a*, by turning which the interior of the burette is put in communication with the tube through the axial bore. The cock *b* being also opened, gas is allowed to pass in till the air previously contained in the holder has been expelled by the gas, when both cocks *a* and *b* are closed. The end of the cock *a* is closed by a stopper or india-rubber cap, and the funnel filled up to the mark, *m*, with water.

To bring the enclosed volume of gas, which is at an unknown pressure, to 100 c.c. and to a known pressure, water is forced, by means of another funnel, T, and an india-rubber tube, into the burette from below, up to the zero point, of course taking care that the tube is completely filled with water before it is put in communication with the holder. When, after closing *b*, the cock *a* is turned so as to place the holder in connexion with the funnel, *t*, filled with water, a portion of the gas will escape in bubbles till the remainder rests under the pressure of the atmosphere, *plus* a water column of a few centimètres. The water in the funnel, *t*, is retained by capillary attraction in the connecting-tube and the bore of the cock, and stands over the gas enclosed in the burette, so that neither water can enter nor more gas escape. In this way the enclosed gas can always be brought to the same pressure (atmosphere *plus* a water column of a few centimètres), and in the ordinary notation of the results by per centage of the total volume a correction for the pressure, which is made equal before taking each reading, becomes unnecessary.

To carry out an absorbtiometric analysis, room must be made for the absorptive agent within the burette. To effect this, a bottle, F, is connected with the lower end of the holder by its longer tube and the india-rubber tube, *r*, while the tube *s*, fastened to the shorter bent tube, is taken into the mouth, and the water nearly all sucked out of the burette; the cock *b* is then closed, and the bottle, F, removed. The absorbent is then poured into a china basin, *p*, and

* *Comptes Rendus*, 1876, p. 844.

the lower point of the burette immersed below the surface. On opening the cock *b* the liquid absorbent is sucked in. The lower point of the burette is so narrow that capillary attraction keeps it constantly filled to its mouth with fluid, so that no air can enter into the holder during the manipulation.

When the cock *b* is closed, the burette must be laid horizontally, or, better still, well shaken, to promote absorption. The funnel-top must be taken hold of, the opening being closed by the palm of the hand, and the burette violently shaken lengthwise; any warmth from the hand coming in contact with the graduated tube is thus avoided.

To ensure complete absorption of the constituent portion of the gas by the reagent, after shaking as above, more of the absorbent is admitted, and this process repeated till the level of the fluid in the measuring-tube remains constant. Before reading off, the measuring-tube is connected, by turning the cock *a*, with the water in the funnel, *t*, when the water flows in till the former pressure is re-established; if needful, the funnel is filled up with water to the mark, *m*. The reading gives at once the per centage of the absorbed constituent that was contained in the gas under examination.

In an analysis of chimney-gas the reagent first applied is solution of caustic potash or soda. The diminution in volume denotes the portion of carbonic acid contained in the gas. To determine the oxygen, a portion of the alkali solution is sucked out, and a concentrated solution of pyrogallic acid introduced. Pyrogallate of potash is formed, and the presence of oxygen may be at once detected by its colouring the salt; the burette is shaken for some time, until, when the lower aperture is introduced into the absorbent mixture and the cock *b* opened, no more enters the tube; finally, water is admitted from the funnel, *t*, till the former pressure is re-established.

To determine the carbonic oxide, the absorbents hitherto employed must be completely removed. The ease with which this operation can be accomplished makes this burette particularly convenient. The pyrogallate is sucked out by means of the bottle, F, to within a few drops; by opening the cock *a* a powerful jet of water is forced into the tube from the funnel, *t*, washing the sides completely. The cock *a* is then closed, and the cleansing water sucked out as before. By repeating this process a few times the absorbent is completely removed, and another can be introduced through the lower point of the burette.

In the case of an analysis of smoke-gas, hydrochloric acid or ammoniacal solution of chloride of copper is introduced into the tube, and manipulated as before. As these concentrated solutions readily yield hydrochloric acid or ammonia to the residue of gas, causing slight errors, it may be advisable to replace the absorbent by water, in the manner already described, before reading off.

The analysis of a complex gas mixture, such as the determination of some constituents of coal gas, according to Berthelot, which requires the successive action of several reagents, as sulphuric acid, bromine, nitric acid, &c., is easily carried out by means of this burette, with slight modifications in the manipulation.

The accuracy of the results so obtained, if the usual precautions are observed, is quite equal to that yielded by the apparatus ordinarily in use for technical gas analysis. Very minute accuracy, however, is of the less importance in the researches for which these apparatus and the gas burette now described are employed, as in many cases a merely qualitative gas analysis would be sufficient for the objects of the experimenter, if it were not that it would require just as much labour as a complete quantitative examination. The burette in question is also distinguished from others by the two cocks being constantly kept closed by fluid, so that loss of gas by leakage is hardly possible. How far the burette is available for analysis of non-absorbable gases, by means of combustion, has yet to be tried.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

IRON PEROXIDE.

Sir,—With reference to the purification of gas by iron peroxide, it would seem likely that, other things being equal, an ore which contains most iron peroxide is the most suitable; and, if that be so, it follows further that hematite (ground), which is a pure peroxide of iron, is the best form of ore that can be used, either alone, or mixed with a poorer ore.

I have said "other things being equal," and from the fact that hematite is so little used, if at all, there must be some serious objection, practically, to it. I shall feel much obliged to any of your readers, if they will tell me of any cases where it has been tried, and the causes of failure, if any. A Gas Director.

[We do not know of any instance in which ground hematite has been used in purification.—Ed. J. G. L.]

MR. VERNON HARCOURT'S COLOUR TESTS.

Sir,—I intrude on your space from a conviction that my fellow gas makers throughout the kingdom will thank me for calling their attention to the very valuable (because simple and reliable) means of quantitative analysis of their gas in respect of sulphur, both in combination with carbon, and in the simpler form of sulphuretted hydrogen, and also in respect of carbonic acid, which lies now at their hands, in the shape of Mr. Vernon Harcourt's apparatus, commonly called his "colour tests."

The principle throughout the tests is the saturation of standard solutions to a degree of intensity which is recognized by comparison with standard coloured solutions, the quantity of gas being carefully measured by means of an aspirator discharging into graduated cylinders.

The necessities of modern purification involve a correct knowledge of the proportion of the various impurities at all stages of the manufacture, and no other analysis open to those who are not expert chemists will give the results without the delay of many hours, and great risk from imperfect manipulation.

These instruments give, in the course of a few minutes, a very close approximation indeed to the results of more tedious and formal testings, and can, after a short instruction, be placed in the hands of any intelligent workman.

For the past six months I have found the sulphur and sulphuretted hydrogen tests such a boon, that I feel constrained to point out to my gas-making brethren, who may not yet have tried them, how useful they are.

An apparatus for ammonia is yet required, but at first sight this appears to be so easy of attainment, that I feel sure Mr. Harcourt will not keep us long waiting for it.

Your advertising columns have already pointed out where the apparatus can be obtained, and I need only add that their low cost is one more point in their favour. Hy. E. Jones.

Gas-Works, Wapping, E., Oct. 9, 1877.

NAPHTHALINE.

Sir,—The special attention of gas managers may be directed to the valuable paper of M. Lucien Brémond, a translation of which appeared in the Journal for the 25th of September. This deals with the question of the deposition of naphthaline, and shows that the phenomenon is due to the condensation of the aqueous vapour contained in the gas, the two occurring simultaneously. The author details certain experiments corroborating this view. In these experiments the gas was desiccated by being passed through unslaked lime in lumps, and the gas, though afterwards subjected to a very low temperature, did not deposit naphthaline, although the same gas, undried, did so very abundantly.

The further interesting fact appeared, as a result of the experiments, that the gas which was deprived of its aqueous vapour was invariably increased in illuminating power to the extent of 6 per cent. This circumstance of the increase in illuminating power of dried gas over undried, as the author observes, was also commented on by the London Gas Referees, in their 1871 report, "On the Principles of Gas Illumination."

This paper is another contribution to the solution of some difficulties in gas lighting, and may serve to account for the increased illuminating power of gas which is often found at the farthest limits of the supply in a district. Instead of losing in illuminating power in traversing the mains, as was at one time believed, it is frequently observed that there is an absolute increase in illuminating power (due undoubtedly to the desiccation of the gas in travelling), though few hitherto have been bold enough to assert the fact. Thomas Newbigging.

5, *Norfolk Street, Manchester, Oct.* 9, 1877.

P.S.—Since writing the above, I have read the letter of your correspondent, Dr. Phelps, and I concur with him in his congratulations to M. Brémond for the excellence of his paper, and the great service he has therein rendered to the gas world. T. N.

ARE STATUTORY COMPANIES BOUND TO REGISTER?

Sir,—I shall be pleased if you will permit me to seek information, through the Journal, upon a matter of great importance to gas companies.

The company I represent were formed and duly registered under the Companies Acts, 1862 and 1867. Three years later the company were authorized by Provisional Order, under the Gas and Water Works Facilities Act, 1870. By that Order we are empowered to raise additional capital, over and above the sum named in the Articles of Association and the amount stated at the time of registration.

What I wish to ascertain is, whether the company are still under obligation to annually register returns of their capital and members, now that we have parliamentary authority for raising such capital, and for carrying on the undertaking? The Provisional Order expressly states that the share capital shall not exceed the sum named therein, unless authorized by Provisional Order or Act of Parliament. On the other hand, the Companies Acts, 1862 and 1867, simply require that any increase shall be duly registered within a given time. It thus appears to me that the Provisional Order overrides, or is superior to, the mere legal authority or status conferred by registration under the 1862 and 1867 Acts, and, as I take it, dispenses with the necessity of the annual registration of the capital and members of the company; parliamentary authority being alone sufficient for the purposes of the undertaking.

I may be excused for pointing out that the provisions of the several Acts referred to are totally dissimilar in many other respects, and of them I will mention the following:—Formation of company, name of company, number of shareholders, quality of shares, amount of capital, nature of business, dividends, accounts, balance-sheet, winding-up of company.

I shall much esteem any information upon this matter, either from yourself or any of your readers. W. W.

Oct. 11, 1877.

[We have made inquiries at the Joint-Stock Companies Registration Office, Somerset House, and are informed that, notwithstanding the existence of the Provisional Order, a company registered under the Acts of 1862 and 1867 are bound to make the annual returns required by those statutes.—Ed. J. G. L.]

The Warren Farm Well at Brighton.—On the 9th inst. a proposal was considered by the Brighton Board of Guardians relative to abandoning the well-known Warren Farm Well. The well reaches to a depth of 1285 feet, the shaft being 6 feet in diameter down to 400 feet, and 4 feet for the remainder. Its cost was between £6000 and £7000, and when it was sunk in 1858-62, considerable interest was manifested by geologists and others in the operation. It was constructed in order to supply the Warren Farm Industrial Schools, which stand on the Downs above Brighton, but it has now been suggested that the schools could be equally satisfactorily supplied from the corporation works. A committee who have considered the question have, however, been reappointed, with power to take scientific advice as to developing the capabilities of the well, from which it is stated that it is possible to supply the whole of Brighton with water of the purest quality.

ACCOUNTS OF THE METROPOLITAN WATER COMPANIES, FOR THE YEAR 1876-7.

(The Accounts of the First Five Companies are for the Year ending March, 1877; the Last Three, December, 1876.)

Statement of Share and Loan Capital, and Expenditure on Capital Account.

Companies.	Total Share Capital authorized.	Share Capital Paid up.	Loan Capital authorized.	Mortgage and Debenture Debt.	Total Share and Loan Capital authorized.	Total Share and Loan Capital Paid up.	Premiums received on Shares Issued.	Total Expenditure on Capital Account.
	£	£	£	£	£	£	£	£
Chelsea	1,058,750	984,480	210,000	128,800	1,268,750	1,113,280	...	1,093,099
Grand Junction	1,000,000	966,860	250,000	242,700	1,250,000	1,209,560	...	1,170,125
Lambeth	1,250,000	1,107,987	200,000	195,965	1,450,000	1,303,952	6,065	1,299,212
Southwark and Vauxhall	1,518,000	1,358,000	482,000	431,981	2,000,000	1,789,981	423	1,748,985
West Middlesex	1,155,066	919,453	200,000	...	1,355,066	919,453	9,365	953,908
East London	2,020,000	1,625,560	...	250,000	2,020,000	1,875,560	37	1,913,320
Kent*	600,000	575,497	150,000	42,000	750,000	617,497	5,567	542,733
New River†	2,019,958	1,884,898	1,000,000	971,643	3,019,958	2,856,541	See Note.	2,892,802
Total	10,621,774	9,422,735	2,492,000	2,263,089	13,113,774	11,685,824	21,457	11,614,184

* The Kent Company's "Share Capital Paid up" is stated at £575,497 10s., the actual receipts being £500,212 11s. 3d.

† The New River Company's shares, as established by charter, are freehold, and are divided into moieties—one moiety, or 36 parts, being held by the incorporated "adventurers;" the other moiety, or 36 parts, being originally held by King James I., and subsequently by persons now called King's Shareholders, who are not incorporated with the adventurers. Both these moieties are again subdivided, and held by numerous persons, and being real estate, are subject to entail and to trusts for minors. By this company's Act of 1852 the amount "expended" by the company in their works "then in existence" was declared to be £1,519,958 and upwards, and the capital of the company was deemed to be £1,519,958. This Act did not, however, create shares or a share capital, or alter or affect the nature, rights, or status of the property as existing under their charter, the rights under which charter are, by the same Act, expressly reserved. This Act authorized the taking of certain lands for special improvements in their then existing works; and the company were by that and by subsequent Acts in the years 1854 and 1857 authorized to raise on bond or debenture stock £1,000,000 for special improvements and for their "general purposes." The amount of this bond debt, as it existed on Dec. 31, 1876, is here set forth:—

Bonds at 4 per cent.	£90,900
Debenture stock at the same period, at 4 per cent.	880,743
	£971,643

By "The New River Company's Act, 1866," the company were enabled to create a new description of shares, declared to be personal estate, to the amount of £500,000, for their general purposes. The amount of these new shares, as existing on Dec. 31, 1876, is here set forth:—

442 fully paid (£100)	£44,200
4557 on call (£70) paid	318,980
	£363,180
Amount received in advance of call	1,760
	£364,940

The dividend on these new shares is to be *pari passu* with that paid to the proprietors of the original shares of the company.

Details of Expenditure and Revenue.

Companies.	Maintenance.							Management.				Total Expenditure for Maintenance and Management.	Water-Rents accrued to Date of Account.
	Reservoirs.	Distribution Works.	Pumping.	Filtration.	Salaries, &c.	Thames and Lea Conservancy, &c.	Rents, Rates, Taxes, and other Charges.	Directors and Auditors.	Salaries, &c.	Collectors Commission.	Other Charges.		
	£	£	£	£	£	£	£	£	£	£	£	£	£
Chelsea	355	3,699	6,766	957	3,360	1,300	4,832	1,242	2,561	2,058	1,304	28,434	92,143
Grand Junction	825	4,394	37,174	1,132	4,186	1,550	6,788	1,062	2,842	3,133	2,077	65,163	126,140
Lambeth	1,527	7,515	20,751	1,072	5,107	1,252	8,057	1,886	1,718	3,069	1,719	53,673	134,314
Southwark and Vauxhall	723	16,297	21,331	6,535	4,225	1,305	8,908	1,020	1,711	4,488	3,237	69,780	146,302
West Middlesex	1,773	3,395	12,529	984	5,436	1,319	8,858	2,494	3,410	3,964	2,000	46,162	151,581
East London	4,130	6,907	13,046	2,551	8,668	4,667	18,902	2,166	3,158	5,743	4,480	74,418	186,943
Kent	213	2,128	8,896	...	2,238	...	4,412	2,099	866	2,120	1,138	24,110	77,104
New River	6,778	22,042	18,741	3,007	9,259	2,433	38,176	6,589	7,943	11,508	4,036	130,512	364,454
Total	16,324	66,377	139,234	16,238	42,479	13,826	98,933	18,558	24,209	36,083	19,991	492,252	1,278,981

Expenditure and Revenue per Million Gallons.

Companies.	Maintenance.					Management.			Total Expenditure per Million Gallons.	Water-rents per Million Gallons.	Average Daily Supply.
	Maintenance and Repair of Reservoirs, &c. —including Cost of Labour and Materials.	Maintenance and Repair of Mains, Pipes, &c., and Works connected with Distribution including Labour and Materials.	Pumping-Engine Charges, Coals, Labour, &c.	Filtration —including Cost of Materials and Labour.	Salaries and Wages of Engineer, &c.	Directors and Auditors.	Salaries of Secretaries and Clerks.	Collectors Commission.			
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	Gallons.
Chelsea	0 2 6	1 6 4	2 8 3	0 6 10	1 3 11	0 8 10	0 18 3	0 14 8	10 2 8	32 16 9	7,688,225
Grand Junction	0 4 0	1 1 5	9 1 1	0 5 6	1 0 5	0 5 2	0 13 10	0 15 3	15 17 6	30 14 7	11,247,204
Lambeth	0 6 5	1 11 9	4 7 9	0 4 6	1 1 7	0 8 0	0 7 3	0 13 0	11 6 11	38 7 10	12,961,755
Southwark & Vauxhall	0 2 1	2 7 10	3 2 7	0 19 2	0 12 5	0 3 0	0 5 0	0 13 2	10 4 8	21 9 2	18,678,808
West Middlesex	0 9 6	0 18 2	3 7 1	0 5 3	1 9 1	0 13 4	0 18 3	1 1 3	12 7 4	40 12 1	10,228,642
East London	0 9 3	0 15 6	1 9 4	0 5 9	0 19 6	0 4 10	0 7 1	0 12 11	8 7 5	21 0 6	24,292,939
Kent	0 1 7	0 16 2	3 7 7	...	0 17 0	0 15 11	0 6 7	0 16 1	9 3 2	29 5 11	7,190,305
New River	0 14 2	2 6 1	1 19 2	0 6 3	0 19 4	0 13 9	0 16 7	1 4 1	13 12 9	38 1 8	26,147,333
Mean	0 7 7	1 10 8	3 4 4	0 7 6	0 19 8	0 8 7	0 11 2	0 16 8	11 7 5	29 10 11	118,435,211 Total.

TAUNTON WATER SUPPLY.—The arrangement between the Taunton Corporation and the Water Company for the transfer of the water-works having been completed, a cheque for the purchase-money—£20,000—was drawn at the meeting of the town council on Tuesday last.

SCARBOROUGH WATER SUPPLY.—A special meeting of the shareholders of the Scarborough Water-Works Company was held on Wednesday last—Mr. John Woodall in the chair—for the purpose of considering the report of Mr. E. Filliter, C.E., Leeds, respecting the further supply of water to the town by the construction of one or more reservoirs and filtering-beds in Flyingdales and Scalby, and of other works in connexion therewith. The engineer read his report and estimates of the scheme, the calculated cost being £55,000. It was proposed to go to a spot at Harwood Dale Beck, from which it was expected 1 million gallons of water per day would be derived by catching the rainfall of the district and impounding it in the reservoir. The area of the district with which it was proposed to deal was 2300 acres. The proposed reservoir would cover about 60 acres of land, and would be about 60 feet deep, delivering water at a height of 400 feet above the level of the sea. The water is intended to be carried by a conduit-pipe to the high ground immediately above Scalby, where there is a very convenient situation for filtering it. After filtration the water would be sent forward by another conduit-pipe to another service reservoir at Fountain's Hill, Falsgrave, whence it would go into the town. The chairman said that the increased supply was imperatively necessary. When the scheme for providing water-works was first propounded, it was anticipated that only 30,000 gallons per day would be required. Since then the supply had reached 800,000 gallons daily. Replying to questions, the chairman said the corporation had always, under certain conditions specified by Act of Parliament, the right to acquire the works; but, whatever action the corporation chose to adopt, the company meant to go on with the extension of their business. Resolutions enabling them to carry out the new scheme, and raise money for the purpose, were then passed, the chairman stating that an unopposed Bill would cost about £1000.

Legal Intelligence.

WANDSWORTH POLICE COURT.—Friday, Oct. 5.

(*Before Mr.* Bridges.)

MITCHAM GAS COMPANY *v.* THE WIMBLEDON LOCAL BOARD.

LAYING MAINS IN PUBLIC ROADS.

In this case, arising on a summons taken out by the Mitcham Gas Company against the Wimbledon Local Board, "for that on the 25th day of September last they did refuse permission to the said company to lay down a certain gas main-pipe under the footpath or pavement in the Merton Road, Wimbledon," Mr. Besley appeared in support of the summons, and Mr. Douglas Straight for the local board.

Mr. Besley, in opening the case, said that the business of supplying gas to Mitcham and Wimbledon was commenced in 1848, and by an Act obtained in 1867 the company were incorporated. There was no dispute that the *locus in quo* was within the district of the company. The Gas-Works Clauses Act of 1847 was incorporated with the Company's Act, and as the General Act contained a definition of what was a "street," there would not be any dispute that in the ordinary acceptation of the word "street" it included the footways as well as the carriage way. The real question between the parties was this. The proposal was made, and a plan submitted by the company to connect two 12-inch mains, that were at present broken at points shown on the Ordnance plan, by about 1200 yards of main, and to carry that main along the footway. The local board objected to this, and wished the main to be carried under the roadway. The grounds on which he asked the magistrate to adjudicate in favour of the company were these: First, the expense of supply by mains and service-pipes was an important matter in a public point of view, because the more economically the work was carried out, the sooner would a reduction in the price of gas take place. The Act required that as the company prospered there should be a diminution in the price of gas, and, of course, therefore, an extravagant outlay would necessitate a larger amount of income to pay the statutory dividend, and until that was paid the public could not claim any reduction. He should prove by evidence that it was cheaper to lay the 12-inch main underneath the footway than under the carriage way. Further than that, the company had the expense imposed upon them of making good all the pavement and roadways with which they interfered. If the mains were in the road, to lay the service-pipes would involve the breaking up of the road as well as of the footway, and obviously a greater expense would be entailed on the company than if the main were in the path. Another most important ingredient in the matter was the safety of the public. If there was any escape of gas, the company were under considerable liability. An instance occurred at Brighton last winter, where several houses in the King's Road were shattered, in consequence of the main not being under the pathway, but in the carriage way; for a steam-roller going over the carriage way broke the main of the Brighton Gas Company, and, without its being known to the company, the gas escaped into the houses, and several of them were wrecked by an explosion. The weight of traffic over a road was of course likely to cause an escape; and without shadowing forth the possibility of Wimbledon being blown up, there was this to be considered, that the annual repairs of mains, where they were exposed to heavy traffic, was greater. Leakage was a loss to the company and an annoyance to residents, and the leakage caused by the disturbance of the mains was really amazing. It appeared that the board wished the company to lay the main in a trench that had been dug for sewerage purposes, the sewer being only 3 feet from the kerb of the road, and having been opened not more than two years ago. Evidence would be given to show that placing the main in that position would expose it to unusual risk, from the fact that the ground did not consolidate in two years when once it had been disturbed. The practice was also a matter to be taken into consideration, and he should be able to show that in the districts supplied by the Phœnix and South Metropolitan Companies the mains were invariably laid in the footway, because by that means facility was afforded for putting in the service-pipes that were required without disturbing the road in places where it was very difficult to bring it again into working order. He believed that the plan the company wished to adopt was the best for the public, for the consumers, and for the local board, who could have no interest except to see that the public were protected in every possible way.

Mr. *J. J. F. Stevens*, examined by Mr. Besley, said he was an engineer at the Darlington Works, Southwark Bridge Road; he was also engineer to the Mitcham and Wimbledon District Gaslight Company, and to the West Kent Company. He had been connected with gas companies for many years, and had experience with reference to the laying of gas-mains in suburban districts. He was informed that the greater portion of the mains of the South Metropolitan and Phœnix Companies were underneath the footways. At Wimbledon the company proposed to carry their 12-inch main in the footway, between the points shown on the plan. He did not think there would be much difference in the outlay, but it might be a little cheaper to lay the main in the footway than in the roadway. It would be less expensive to put on the service-pipes to a main underneath the footway than underneath the carriage way, for that side of the road.

Mr. Besley: Is there anything in the suggestion that asphalte would render it impracticable to put the service-pipes from a main underneath the footway?

Witness: Nothing. We should have to make it good the same with asphalte as with anything else.

Are you bound to make good the pavement, whatever it is?—Bound to make it good, and keep it good for 12 months.

It would make no difference whether it was asphalte or York paving?—Whatever it is we shall have to reinstate it, and keep it in order for 12 months, and we must reinstate it to the satisfaction of the surveyor of the local board.

May they, and do they, reinstate it themselves and charge you with the cost?—In some cases they do, but in other cases we do it ourselves; but it must be done to their satisfaction.

Mr. Bridge: Is not the question really what will be the least inconvenience to the public?

Mr. Besley: And also the question of safety?

Witness: Under the footpath I should consider it would be of less inconvenience, because it is very easily put back again—fresh gravel put on and the thing rolled down—whereas it is a long process in the road, and the road requires constant repairs to make up for the sinking which takes place, and which would not take place in the path. When the main-pipes are in the footway they are not so liable to be broken as when in the carriage way. They are constantly being fractured when in the carriage way, and I could give you a number of cases that have occurred where our mains have been so fractured. There was one case at Wimbledon, where they blew up the fountain through a fracture in the main. The main was broken by some heavy waggon passing over it.

With reference to this particular road, is there a sewer there within 3 feet?—There is a sewer running the whole length of the road—a brick sewer. A large trench had to be dug for the purpose of constructing the sewer, and the reason that we object to lay a 12-inch main in the ground is on account of the sewer trench being there.

Assuming that any accident occurred to the sewer, could the repairs be done if the gas-main were on the top of it?—It could be done, but there would be a certain amount of risk to our main.

You say that in the event of an accident to the sewer rendering repairs necessary, the sewer being underneath your main would render your main liable to fracture?—Just so.

Cross-examined by Mr. Straight: The road is about 35 feet wide. The footpath is 9 feet in one part, and then is irregular, varying from 4 feet to 7 feet. The footpath is in front of plots that are proposed for building, and houses are being erected. There is at present a gas-main laid on the left hand side of the road, and there are a considerable number of houses on that side. We should hardly lay a gas-main at the same depth in a footway as in a roadway, but the saving in trouble is very trifling.

Mr. Straight: Then really the putting it in one place or the other is a matter of indifference to you?

Witness: No, it is not. It would be a little cheaper in the footway, but not to any extent.

You talk about breaking the mains under the carriage way, but at the present moment are you not actually repairing some mains that run under the footway on Wimbledon Railway Bridge?—But there is a reason why they should be broken. That is an iron bridge, subject to expansion and contraction, and about March and September we have to go through and set those joints up again.

With regard to the repairing of asphalte footways, have you had any experience?—Not much.

Are you prepared to say it is easy to put back an asphalte footpath in the same condition in which it was before it had been broken up?—I am prepared to say, where we have broken up the footpaths, we have put them back to the satisfaction of the surveyor.

Not of the present surveyor? The late surveyor let you put things pretty much as you liked?—Certainly not. He had the thing properly done.

Re-examined by Mr. Besley: The new surveyor has only been appointed within the last week.

Mr. *Thomas Dominick Tully*, examined by Mr. Besley, said he was superintendent of the London Gaslight Company, and had been with them for 22 years. He was also one of the members of the Board of Works of the Wandsworth district. A great many mains had been broken in the districts with which he was connected of late years, owing to the use of steam-rollers. The subject had occupied the serious attention of his board, and the solicitor had been directed to call the attention of the parochial authorities in every district to the fact. In consequence of this liability to accident, the mains of the London Gas Company had been placed in the footways instead of the carriage ways. The last main he laid was a 36-inch main, three times the size of the one in question, and that had been laid down Nine Elms Lane, under the footway. From his experience it was an advantage to the public to break up only the footway, instead of both carriage way and footway. In every case the pavements had to be made good to the satisfaction of the surveyor of the local board. There was no particular charm about asphalte that it should prevent gas going into people's houses. If they were without water or light, no matter what the paving was, it must be broken up in order to give them a supply.

Mr. Besley: Would you advise the placing of a 12-inch gas-main on the top of a newly-made sewer in a carriage way?

Witness: We hold the contractor responsible in each case; and where a sewer-trench is opened under our gas-pipe, we invariably go to the expense of removing the pipe out of the trench to another part of the road.

Are you aware of any disadvantage resulting from laying a main underneath the footway?—There is no disadvantage at all. The advantages are very manifest. We have adopted that course for the last ten years. For instance, in Holborn we have a main under the footway on each side; and if the gas has to be laid on to a house, a man can do it before the traffic is about in an hour, whereas if the main is in the roadway, it will take him six or seven hours to connect the service-pipe.

Mr. Straight: Your view is, it is better to give foot passengers in a country district the inconvenience of going into the gutter, rather than put vehicles to the unpleasantness of going over the stones?

Witness: The inconvenience of country foot passengers cannot be compared to that of the passengers in a place like the Strand. It is only a question of a few days, and then the thing will last for 20 years.

Mr. *Henry John Green*, examined by Mr. Besley, said he was an inspector in the employ of the Mitcham Gas Company, and was formerly connected with the Phœnix and the Chartered Companies. A sewer had been put in the road in question within the last two years within three feet of the kerb. The local board wished the gas-main to be placed at a distance of four feet from the pavement, and that would be placing it right on top of the sewer, exposing it to the certainty of subsidence, and thereby to leakage and to chance of explosion.

Mr. Besley said that was his case, subject to any question which might subsequently arise.

Mr. Straight said he was instructed on behalf of the Wimbledon Local Board to address some observations to the magistrate, and to justify the course they had thought proper to adopt in resisting this application on the part of the Mitcham Gas Company. The Wimbledon Local Board, for reasons that had occurred to them, awakening to the fact that perhaps they had been a little lax in former years, had felt that the proposal made by the gas company was one they could not accede to. Of course they would bow with respect to the magistrate's decision, but until then they would resist the application. They furthermore pointed out one or two matters which, in his judgment, fully justified them in the course they were adopting. He should contend that the prosecutors of this summons had altogether mistaken the operation of the statute, and had tried to place upon the sections a construction which was never contemplated by the Legislature. The sections commencing at section 6 specifically confined the operations of the Act. The purposes for which the sections were framed were with respect to the breaking up of streets for the purpose of laying pipes, and then, in the 6th section, it said "the undertakers," as in that case the Mitcham Company, when they broke up the soil and pavement of streets and bridges within the limits of their special Act, should do so under the superintendence of the local authorities. Surely with regard to that section he was correct in contending that the words were, "under such superintendence as was hereinafter provided." That meant that the statute made certain provisions as to the mode and manner in which gas and water companies were to be under the superintendence of the authorities, who were the highway authorities for the purposes of the Act. The 8th section clearly contemplated three clear days notice to the local authority of the intention to open and break up the streets except in cases of emergency, when they might proceed to do the work at once. To that point it was declared that they should have power to open and break up, but that they should do it under superintendence, and for the purpose of securing that superintendence, by the 8th section, that they should give notice to the authority for

the purpose of that authority practically directing and superintending how the streets or drains were to be broken up; that was to say, no streets or drains should be opened or broken up except under the superintendence of the local authority. With reference to the plan, he should contend that it was not a plan of construction in the sense of a plan as to the mode in which the pipes were to be laid, but a plan as to the way in which the roads or streets were to be broken up so that the public traffic might not be interfered with. It then said that if the authorities did not attend at the time fixed for the opening of any such street, or should refuse or neglect to superintend the operations, the undertakers might perform the work. As far as the local board were concerned, they did propose a plan, and were prepared to superintend the operations. What did the Act mean? It meant to leave to his clients the full control and authority as to the way in which the work was to be done. That would be his contention upon that particular branch of the question, and he did not wish to proceed further if the magistrate was with him upon that particular matter. Of course if his worship was against him he must proceed to show that the board had proposed a totally different plan of putting the main under the roadway, and having proposed it, the company were put out of Court.

Mr. BRIDGE: I clearly do not think your clients are masters of the direction in which the pipe is to go. I should rather have thought the company were masters of the place in which the pipe is to be put, and they are to do such works as may be necessary for laying down gas-pipes; then as to how it is to be done is a matter in which the authority of the governor of the road is to come in. As to the place, I am rather against you than with you, and if I have the power to decide it at all, it must be upon the question of which is the most convenient course.

Mr. STRAIGHT said, assuming the magistrate was accurate in the view taken of the statute, surely, taking all these sections together, he would be indisposed to interfere with the discretion of the local board, except upon very strong cause being shown—*i.e.*, being reasonably satisfied that there was no evidence on their part of *mala fides*, or any desire to tread upon the corns of the gas company from improper motives. He would be very indisposed to say that he should step in and interfere with them in the course they were adopting in regulating the district over which they had control. It was true that for some time past the gas-mains had been laid under the footways, but that was rather from laxity on the part of those who had the control of these matters than any other reason; but they had, upon a consideration of the matter, come to the conclusion that it was highly undesirable that the gas-mains should be laid under the footways. The result of so doing was that if they opened a portion of the footway for the purpose of laying gas-pipes, they must do it in such a way that it rendered the path absolutely impassable. He should call the surveyor who would speak as to the sewer and would state that there was no hard and fast line made at all by the Wimbledon Local Board as to the particular point at which the gas-pipe was to be laid. All they said was that the pipe must be placed in the road, but by all means let it be placed at such a point from the sewer as would prevent any danger. The board had not come forward in any capricious spirit to fight this question. They entertained their own views about it, and thought it rather hard that, being the representatives of the ratepayers, and having the interests of the district at heart, they should be interfered with in this manner, in the exercise of a discretion that they believed to be a reasonable one, and one that, as far as they were concerned, was in accordance with the general practice. He hoped, in the long run, the magistrate would feel that this was a case in which he would be indisposed to interfere with the discretion of a local authority competent to deal with the question, and to decide whether or no matters of this kind should be carried out.

Mr. BRIDGE: Does not the argument apply both ways? You say the local board are the best persons to decide it. Then it will be said, on the other hand, that the gas company, who have to do the work, must be the best persons to know where the pipes should go along the road. Does not the argument cut both ways?

Mr. STRAIGHT: The gas company only come there by sufference.

Mr. BESLEY: I beg your pardon, the gas company are there by statute.

Mr. BRIDGE: My strong impression is, the proper meaning of the statute is that the company are to put their pipes where they like, but the mode of putting them, and the plan of operation of breaking up the roads, is to be under the control of the local authority, and, that being so, I am not sure that I ought not to say I decline to arbitrate on this point, because I do not think it is the meaning of the Act. Of course, if both parties wish me to do it, I do not like to refuse.

Mr. STRAIGHT: I certainly learn for the first time that there is this arbitrary and overwhelming power in gas companies.

Mr. BRIDGE: I think it is a matter you ought to take some decision upon.

Mr. BESLEY: I should like you to decide it, and if my friend objects to your decision he can very well raise the question.

Mr. BRIDGE: All I feel is that I am not a proper tribunal to decide a point of that sort, as to which would be most convenient to the public. If you wish it I will hear the evidence and decide it.

Mr. BESLEY: We are most desirous that a decision shall be come to.

Mr. BRIDGE: If the board do not propose a plan, why not carry out the work and let them bring an action of trespass?

Mr. STRAIGHT: We do propose a plan. We say when you put your spade into the earth you are not to put it into the footway, but into the road.

Mr. BRIDGE: The plan is as to the particular way of doing it. However, if you wish it I will go on.

Mr. *Thos. Mason*, examined by Mr. STRAIGHT, said he was surveyor to the Wimbledon Local Board. He knew the road along the footway of which it was proposed to lay this gas-main. In his judgment it was decidedly inconvenient to have the main laid under the footway. It was more convenient for the public to have it under the road. It was possible to lay the main in that wide road without any interference with the sewer-pipes or without any danger.

Mr. BRIDGE: The question is, supposing it was laid in the road, and afterwards the sewer-pipe got out of order, would there be danger of injuring the mains when the sewer was repaired?

Witness: None at all.

Cross-examined by Mr. BESLEY: He had not been surveyor to a gas company, but had superintended some thousands of pounds worth of gas-mains laid by Mr. Stevens. He became surveyor to the Wimbledon Local Board on Monday last.

Mr. *W. Scott*, examined by Mr. STRAIGHT, said he was chairman of the Wimbledon Local Board, and had had his attention called to the road in respect of which this matter had been going on. It was a main thoroughfare to the Wimbledon station. It was proposed to asphalte the footpath. The objection to the proposition of the gas company arose from a large number of complaints on the part of the parishioners. When the company had broken the path, it had taken from three to six months before it had been restored, and foot passengers had to turn off what had hitherto been a good path into the gutter. For reasons of that nature the board had determined not to assent to this course of proceeding. He believed the advantage and convenience of the public would in every shape be served by putting the mains in the roadway. The road was as much as 60 feet wide in some parts. There was a sewer along the road, but he was surprised to hear that the gas-mains would come so near to the sewer as had been stated, because he measured the road, and found there was a distance of something like nine feet between the part proposed for the main and the sewer.

Mr. BRIDGE: How far do you propose to put it from the footpath?

Witness: I think 4 feet, but we have no objection to their going farther into the road.

Why should they not come close to the footpath?—There is no objection at all.

Cross-examined by Mr. BESLEY: Where we propose that the company shall place their mains I think it is about 9 or 10 feet from the kerb. I am aware that the board have power to make good the pathways, and compel the company to pay for it.

Mr. BESLEY: If your surveyor had attended to the pathway it could have been put in order in less than six months?

Witness: That I do not know.

If the pathway were put in order there would be no objection to the main being put down there?—If it could be put in order within a few days.

Supposing that you required them to make a length of 40 feet a day's work, and to have a wooden frame, the same as they do at the buildings in Cheapside, there would be no objection?—There would be an objection on the part of the persons living in the houses.

As long as the foot passengers could walk cleanly upon a wooden outside pathway, what objection would there be to putting down the main?—I do not know that there would be any objection.

Are you aware that a service-pipe can be put in, if the main is in the pathway, in two hours?—Yes.

And if a trench has to be dug in the carriage way to get at the main it will take a day?—No, I should think not. I should think four hours would suffice—just double—and then the expense would fall upon the owner of the property, and not upon the gas company.

How long have you heard that the consumer has to pay for carrying the service-pipe to the meter?—Since I have paid for it myself—that is about 15 years ago.

You do not know that recent legislation requires the gas company to bring the pipe to the meter?—No.

Re-examined by Mr. STRAIGHT: I am not a director of a gas company. In the event of an escape taking place in the main, it might necessitate pulling up 100 or 150 yards of our footpath, and that would be a great inconvenience to foot passengers.

Mr. *John Townsend*, a member of the local board, said he was a contractor and builder, and was well acquainted with this roadway. The sewer was constructed on the south side of the road, whereas the board proposed that the main should be laid on the north side. Between the sewer on the south side and the footway on the north side there was a very considerable space. Many gas-mains might be laid in the carriage way without any inconvenience. As a member of the Drainage Committee, he should strongly object to the gas company laying a main over the sewer, so that the supposition that had been raised, that the board wanted the company to place the main over the sewer, was absurd. There were surface-drains on the footway, which would be interfered with if the main was placed there. In his opinion it would be more convenient to the public if the main was placed in the roadway.

Cross-examined by Mr. BESLEY: It would no doubt be more expensive to the company. There was one point at which the sewer was only 4 feet from the north kerb, but that arose from a bend in the road.

Mr. BESLEY: So that it would be quite impossible to put down the gas-main without crossing the sewer at some point?

Witness: But that would be a small point. It would not be impossible in this instance, because the road has been increased in width on the north side, and that was subsequent to our laying the drain.

Mr. *William Lee* said he was a sanitary engineer, and had been surveyor to the British Land Company and the National Freehold Land Society for some years. He agreed with the evidence given by Mr. Scott and Mr. Townsend in reference to the convenience of having the main in the roadway. He had constructed considerably more than one hundred miles of road within the last ten or eleven years about the suburbs of London, and this was the first time he had heard of gas-pipe being proposed to be laid in the footway.

Mr. STRAIGHT: In comparing the convenience to foot passengers and the convenience of breaking up the road, you consider there is less inconvenience in breaking the road than the pathway?

Witness: Yes; and one reason is, because the whole of the materials forming the gas concrete or asphalte are of a glutinous and sticky character.

You very nearly leave the soles of your boots on them sometimes?—The footpath having been disturbed, the surface cannot be restored.

Mr. *Alfred Ward* said he was a ratepayer in Wimbledon. The general feeling in the district was against the proposal of the gas company. He suggested that it would be quite easy, if the main was in the road, for the company to tunnel under the asphalte path, and so make the connexion without causing inconvenience to foot passengers. No doubt there would be a little more expense to the company.

This closed the evidence, and the magistrate reserved his decision.

THURSDAY, OCT. 11.

Mr. BRIDGE, in giving his decision, said he had seen the road, and listened to the arguments of counsel, and it seemed to him that the gas company had power to lay down the main where they liked, and it was for the local board—the highway authority—to see that it was done in such a way as to be the least detrimental to the footpaths. It had been argued for the company that it would be less expense, and that the pipe would be less liable to breakage, if put in the footpath; and the local board, on the contrary, had replied that it would necessitate the footpath being continually broken up. As he had been asked to decide it, he was of opinion that the question for him to consider was as to the safety of those who used the roads, and he thought the main would be less liable to breakage, and consequently safer for the inhabitants, if put under the footpath. Therefore he should decide against the board. At the same time, he should suggest that, while the works were in progress, some protection should be given for passengers to walk, and that could be managed by the surveyor to the local board. If the surveyor could devise any such plan, then he (the magistrate) should certainly order the gas company to carry it out.

LAMBETH POLICE COURT.—WEDNESDAY, OCT. 10.

(*Before Mr.* ELLISON.)

DISPUTED CORRECTNESS OF A GAS-METER.

The hearing of the summons taken out by the South Metropolitan Gas Company against the Rev. *R. O. T. Thorpe*, adjourned from Sept. 21, was resumed this afternoon.

Mr. HOWARD appeared for the company, and Mr. MAUDE for the defendant.

Mr. *George Dethridge*, meter-tester to the Metropolitan Board of Works for the southern district, examined by Mr. HOWARD, said he recollected

the meter being brought to his office on the 4th of June. He tested it in the usual manner, and found it to be correct. At the high water level it was positively correct, registering 10 feet exactly. At the low water level it registered 10·25 feet. His certificate merely stated that the meter was correct within the meaning of the Act. According to the Act the meters were allowed to register 3 per cent. against the gas company, and 2 per cent. against the consumer. The meter could not possibly register against the consumer. The mode of testing was to fill the meter to the highest possible level. Under those circumstances it was perfect. He then drew off the water to the lowest possible level, and it registered 10·25 feet. He had tested many thousands of meters in the same way, and did not think a wet meter, after being so tested and certified, could register against the consumer.

Cross-examined by Mr. MAUDE: The test was prescribed by the Act of Parliament; 3-inch pressure of gas was placed upon the meter, and it was then seen if it would register very small quantities. A perfect revolution of the wheel was made, and, if that was found correct, the usual test was applied. The meter was put upon a level base, and filled up to the highest point that it would bear; 10 feet were then passed through it, and it was found that it registered exactly 10 feet. Water was then extracted from it to the lowest possible point, till, in fact, the lights went out. Then a small quantity was put in, so that it would just light up again, and it registered 10·25 feet, or about 2¼ per cent. against the company.

Mr. MAUDE thought the meter ought to have been produced in Court, in order that the indices might be seen. His contention would be that the tests were utterly valueless.

Mr. HOWARD said there was nothing in connexion with the statute to necessitate the production of the meter. The test applied was in accordance with the requirements of the Gas-Works Clauses Act.

The further hearing was then adjourned for an hour, in order that the meter might be brought to the Court. When this was done, the cross-examination was resumed.

Witness said the register had evidently been put back to zero and started again.

Mr. MAUDE: Pending the inquiry as to the correctness of the meter, it ought not to have been passed through all sorts of tests. It has been taken out of Mr. Thorpe's house by the company without his consent or request in any way.

Mr. HOWARD: If my friend will refrain from making any comments until our case is closed, I will show that we have Mr. Thorpe's letter saying he did not object to our taking the meter.

Cross-examination continued: When I took the test the register showed 92,400 feet. [Witness then described the method of testing.] It was tested for accuracy to units, the total number of feet of gas passed through it being 25. It was not tested to tens of thousands. The quality of the gas by which it was tested was that usually supplied by the Phœnix Gas Company, where our office is situated. The test was in accordance with the conditions laid down in detail in the Act. We have nothing to do with the 2 and 3 per cent. clause. We keep a record of the meters we certify, and I recognize this one by the number and the maker. My seal is on it. It was put on not by myself, but under my directions. The number is 19,409. I did not in any way test the meter for tens of thousands. If we suspected there is anything wrong we should do so. It would have taken a week to test it to the full amount that was registered. I am prepared to pledge my oath that the meter was a correct one. Every requirement of the Act of Parliament was complied with. I know that sometimes errors have been found in the higher numbers, even when the units appeared correct, but very rarely. I am acquainted with the last report of the Warden of the Standards. I am not prepared to pledge my oath to the state of the tens of thousands. The object of gas regulators is simply to keep the gas at one uniform pressure. The chances of a wet meter varying are less than in the case of a dry meter. The effect of too much or too little water is to put the light out. The water should be looked to once or twice a quarter. Wet meters are usually put at the entrance of the house. The effect of extra pressure is to increase the consumption if a regulator is not used. I never knew a gas company have to find regulators for private houses. If the burners are improper, gas may pass through them unconsumed. The quality of the gas makes a difference in the consumption.

Mr. ELLISON: You are going beyond anything that is necessary.

Mr. MAUDE said the evidence was leading up to the point he had to submit, that the company must be prepared to prove the quality of the gas which they had supplied. If they could not do so, and the quality varied, so would the consumption and the cost.

Witness: It would increase the consumption at the burner, but would not alter the register. The meter registers the gas, good or bad, that passes through it. An inch of gas is an inch of gas, whether the quality is good or bad. If there is a stoppage in the pipes they are sometimes blown. In some places this occurs once in two or three weeks; in others, not once in two or three years. Naphthaline is created more by gas passing through a warm temperature, and then suddenly through pipes in a colder situation, than if the temperature is uniform. It is not impossible that one of the hands of the register may have dropped, but I should think it would show itself under the test that I submitted it to.

Re-examined by Mr. HOWARD: The reason why a regulator is used in connexion with street-lamps and not in private houses, is that it only regulates the lights on a certain level. It would be necessary to have a regulator on every floor of a house, because the pressure varies according to the height. There is no one present to turn the street-lamps off or on as the pressure varies.

Mr. *Dickinson* identified the meter in Court as that which was formerly in the defendant's house. On the 24th of March it registered 84,600 feet. The water-line was then correct, as he ascertained by the screw.

Mr. *Thomas Grosse* said he took the meter from Mr. Thorpe's house on the 4th of June, and to Mr. Dethridge on the 6th. The index was then 92,400 feet. Between the 4th and the 6th of June the meter was in the company's factory, under the charge of the storekeeper. He could take the state of a meter as well as any one, having been connected with the business 24 years. He knew nothing about the character of the gas passing through the meter when he took the register. When he took the meter to Mr. Dethridge it showed no sign whatever of having been tampered with.

Mr. *Dethridge* said when it was brought to him if it had been tampered with in any way his suspicion would have been aroused.

Mr. *Grosse*, in cross-examination by Mr. MAUDE, said he had been connected with the company 13 years, and was practically acquainted with the testing of gas and meters. The test which had been described by Mr. Dethridge was universally adopted, and was prescribed by the Act of Parliament. He firmly believed it was an accurate test. During his 13 years experience he had never known a meter passed by the Government inspector vary one per cent. He had not read the last report of the Warden of the Standards.

Mr. ELLISON: How far do you think that will be any use to you upon this summons? You see the company summoned the defendant for failing to pay a sum which they say is due. They are told that their meter is correct according to the Government tests, those being the tests that they are bound by.

Mr. MAUDE: I admit that they are bound by the tests, but I submit that you are not bound by it. I refer to the 20th section of the Amendment Act, and I say I am in a position to ask your worship to weigh the probabilities of the evidence, and to say that the test in this case must have failed, and that my client ought not to be compelled to pay the amount he is now sued for. We have it upon the evidence that they have not tested the index up to the point for which Mr. Thorpe is charged. For several quarters he had never been charged more than about one-third of what they now claim for. He has no more burners, and no more gas is consumed. The Government test is merely *primâ facie* evidence.

Mr. ELLISON: You must bring evidence to upset the evidence that has been given.

Mr. MAUDE said he could bring evidence to show that indices had been known to be wrong to the extent of 80,000 feet, though the Government test had been applied. They ought to have gone to the test of the tens of thousands.

Mr. ELLISON said the *primâ facie* evidence was in favour of the company. If that could be upset by other evidence, of course an opportunity would be given to produce it.

Mr. MAUDE said he was prepared to show that the test applied was not infallible.

Mr. HOWARD said Mr. Thorpe had in his letters recognized the consumption.

Mr. ELLISON said that simply meant according to the register of the meter.

The further hearing was then adjourned till Thursday, the 18th inst.

DUDLEY POLICE COURT.—FRIDAY, OCT. 5.

(*Before Messrs.* TILLEY *and* TERRY.)

DISPUTED GAS ACCOUNT.

Mr. *William Ettle* was summoned by the Dudley Gas Company for the sum of £1 2s. 3d., for gas supplied to him.

Mr. OWEN, who appeared for the complainants, said this was an adjourned case, and one of several brought forward by the company. A fortnight ago the defendant, who was represented by his wife, complained that he had recently had a new meter put in his house, and that the sum he was then called upon to pay was more than double he had ever paid in a similar quarter. The meter could have been examined by a competent person, either for the consumer or the company. In the borough of Birmingham there was such a person, and every meter had a mark upon it, certifying it correct.

Mr. *Booth*, the collector, having proved the demand for the money.

Joseph White, the gas inspector, said the defendant's wife asked for a change of meters. Sometimes gas-meters stopped altogether, and then the company calculated on the previous quarters, or rather on the corresponding quarters, when the consumer had been using the gas for some time. He had tested the meter by passing 10 feet through it, and it registered a little fast, which was against the company.

Mr. *Thomas Jackson*, inspector of gas-meters for the borough of Birmingham, said he had tested the defendant's meter, and it was correct according to the Act of Parliament. When 99·30 feet had passed through the meter, 100 feet were registered on the face of the dial. That was correct within the meaning of the Act. The meter was made in 1863, and repaired in 1875. The great increase in the consumption was accounted for by the fact that the people had not been careful as to the pressure. He, as an inspector, was restrained by the Act as to the amount of pressure put on, but consumers were reckless, and could force 10 feet per hour out of a burner which should burn but 5 feet.

The BENCH held that the company had proved their case, and ordered the defendant to pay the amount.

In another case which came before the Bench, the defendant, a woman, was charged with neglecting to pay £5 8s., but she swore that she was dissatisfied with the amount registered, and that she ordered the company to take the meter off at the end of the quarter. The company charged her for some thousands of feet after that. She called witnesses to prove that after the quarter she used lamps, and the Bench ordered her to pay to the end of the quarter only.

BROMPTON COUNTY COURT.—WEDNESDAY, OCT. 3.

(*Before Serjeant* WHEELER.)

CUTTING OFF GAS WITHOUT NOTICE.

The plaintiff in this case—Mr. James Blake, brass-fitter, of No. 50, Walton Street, Brompton—sued the London Gaslight Company to recover damages for improperly cutting off his gas, and removing his meter.

Mr. M'CALL, barrister, appeared for the plaintiff, and Mr. GRAIN for the defendants.

The facts of the case were not in dispute. It appeared from the evidence that the plaintiff had been but a very small customer of the defendants, and on the 9th of July last two of the defendants servants passed the premises in Walton Street, and discovered that brokers were in possession. Fearful that the meter, which was the property of the company, should be lost or damaged, they went in, and without any notice detached it from the pipes and took it away. On behalf of the plaintiff it was not denied that he was in a very impecunious position, but it was contended that being deprived of gas for four days, under the circumstances, made his affairs worse; also that the gas company were bound, under the Gas-Works Clauses Act, 1871, cap. 22, to give 24 hours notice of their intention to remove the meter.

In cross-examination, *plaintiff* admitted that the gas had previously been cut off for non-payment, and that he might have paid a sum not exceeding £1 5s. 9d. for a year and a quarter's gas.

Mr. M'CALL contended that the Gas-Works Clauses Act explicitly provided that 24 hours notice of the removal of a meter was necessary.

Mr. GRAIN urged that the meter might have been stolen or damaged, and that the servants of the gas company were perfectly justified in removing it.

His HONOUR did not think the plaintiff had shown either direct or indirect damage, but left it to the jury.

The JURY gave a verdict for £5, and costs were certified for to that amount.

REDUCTIONS IN THE PRICE OF GAS.—The Gas Committee of the Manchester Corporation are about to recommend the council to reduce the price of gas within the city from 3s. 4d. to 3s., with a corresponding reduction from the prices charged in the out-townships. The Horncastle Local Board have issued a handbill, stating that the price of gas for the half year commencing the 1st of July last will be 3s. 9d. per 1000 cubic feet, being a further reduction of 10d., making a total reduction of 2s. 1d. per 1000 since the works came into their hands on the 4th of January last. At Lowestoft a reduction from 5s. to 4s. 9d. will take place at Christmas next. At the meeting of the Halifax Town Council on Friday last it was agreed to reduce the price from 3s. 8d. to 3s. 4d.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Weekly Meeting of this Board, on Friday last—Mr. C. M. ROCHE in the chair,

The Special Purposes and Sanitary Committee brought up a report, in which, amongst other things, they stated that an excess of ammonia impurity occurred in the gas supplied by the Commercial Gas Company, and tested at the Parnell Road testing-station, on eight days in September last, commencing on the 15th and ending on the 24th, and that the average of the excess of the ammonia over the amount fixed by the Gas Referees was 1½ grain per day, the greatest excess being 4½ grains on the 17th, and the least being slightly under half a grain on the 24th. As the company did not appeal against the gas examiner's returns, they are liable to a penalty of £50 per day for each day during which the excess occurred; and the committee accordingly recommended—"That proceedings be taken against the Commercial Gas Company for enforcing the penalties imposed by the Commercial Gas Act, 1875, section 47, in respect of the excess of impurity (ammonia) in the gas supplied by the company, and tested at the Parnell Road station, on Sept. 15, 17, 18, 19, 20, 21, 22, and 24 last."

Mr. RICHARDSON, in moving the adoption of the report of the committee, said the subject possessed a peculiar interest at the present moment, inasmuch as this was the first time the Board had been recommended by one of their committees to take legal proceedings against a company under any Act of Parliament relating to the supply of gas to the Metropolis, for non-compliance with the terms of the statute. It was also the more peculiar, inasmuch as the company against whom the proceedings were to be taken had two gentlemen connected with it members of the Board. ("Oh!" and interruption.) At all events, this was the first time the Board had had such a matter brought before them. The facts of the case were these. It appeared by the report made by Mr. Keates, the Superintending Gas Examiner of the Board, that in the month of August last there was a very large excess of "sulphur" in the gas of the Commercial Gas Company, as tested at Wellclose Square, and from the explanations he had made to the committee, it seemed that this was due to some unfortunate valve belonging to one of the purifiers not in use, but which ought to have been in use at the time. But for that circumstance, probably the result would have been that no excess of sulphur would have been reported. When the mischief was discovered, it was immediately remedied, and there had been no similar complaint since. But inasmuch as the period when this excess occurred was now beyond the 30 days prescribed by the statute, the default of the company in this respect formed no part of the report of the committee. Then came the question of an excess of ammonia in the company's gas, and the committee had returns showing that from the 15th to the 23rd of September the quantity of ammonia varied from a maximum of 6 grains per 100 cubic feet of gas to a minimum of 2·9 grains, so that there was an excess beyond the statutory requirements of from 3·5 grains to 4-10ths of a grain per 100 feet. The committee, after giving this matter their serious consideration, and having also had the advantage of hearing the engineer of the company, who gave explanations to them in reference thereto, came to the conclusion that there had been such an infraction of the requirements of the referees by the company that it was necessary for the Board to take action thereon. Indeed, he believed he expressed the feeling of every member of the committee who spoke on the occasion, that it would be impossible for the Board at any future time to take action, as the local governing body under the Gas or any other Acts, if they did not proceed against the Commercial Company in this instance. The result of this conviction was the bringing up of the recommendation just read from their report. It was, perhaps, desirable to draw attention to the provisions of the statute under which it was intended to proceed. The 50th section of the Commercial Company's Act said: "The report of the Chief Gas Examiner, on appeal, or the report of a gas examiner, after the time for appeal has elapsed, and no appeal has been brought [and he should say no appeal had been presented to the committee], showing a case of defective power, excessive impurity, or insufficient pressure, shall be conclusive evidence of the liability of the Commercial Company to a forfeiture in respect thereof, and every forfeiture under this Act shall be leviable by distress, and on proof of any such report before two justices, or a magistrate, at any time within one month after the date of the report, such justices or magistrate shall issue their or his warrant of distress accordingly." It would be seen that the proceedings must be taken within 30 days of the date of the report, and such being the case, if the recommendation of the committee was adopted, the Board would have to take speedy action in the matter. He was, as he before said, sorry to bring up such a report. It was the first time in the history of the gas supply of the Metropolis, since this Board had been the local authority for the purpose, and he trusted it would be the last. At the same time, it appeared to him that it was absolutely necessary the Board should take cognizance of what had occurred.

Mr. RUNTZ said this case was of a somewhat important character. The committee had had evidence before them concerning the infraction of the law, and they found, with reference to the excess of sulphur, that it was a mystery to every one. All concerned endeavoured to find out the cause of the excess, but were unable to do so. Dr. Williamson went down to the company's works at the time, but was unable to determine how it arose. Then, with reference to a second infraction—a deficiency in the illuminating power of the company's gas—that they were not in a position to prove, because it was said the instrument employed for the purpose was defective. But, with reference to the last, the excess of ammonia, there could be no doubt that it took place, as reported to the committee. But then it should be borne in mind that, when ammonia once escaped and got into the pipes, it remained there, and was beyond the control of the company. Under these circumstances he thought the Board ought to content themselves by prosecuting the company for an infringement of the law on one day only, and not for every occasion mentioned by the committee. The Board had never yet prosecuted any company, and he, for one, had been in hopes they would not have to do so. Here, however, it seemed to be demanded, but he thought the justice of the case would be met by prosecuting for the offence on one day. The proceedings must be taken within 30 days. Now, the first infraction was on the 17th, the second on the 19th of September, and so on up to the 24th.

Mr. RICHARDSON: The first was on the 15th.

Mr. RUNTZ said that would be beyond the time. Possibly the Board might think that, under all the circumstances, it was not desirable to prosecute at all in this case, although he thought the time had arrived when the gas companies should see that the Board were in earnest in keeping them to their obligations; but his own opinion was that a summons for one day's offence would meet the justice of the present case.

Mr. H. L. TAYLOR understood that the committee had heard the explanation of the company's engineer, and they still thought it was a case which the Board should prosecute. Now, it was not for the Board to decide what the fine or punishment should be. It was their duty, under the authority of an Act of Parliament, to take proceedings before a magistrate, and it would be for the magistrate to hear what explanations the company could give as to the cause of the excess of ammonia, and to modify the fine according to circumstances. He (Mr. Taylor) thought the Board would not be discharging their duty if they did not go in for the eight days; not that they need press for a fine on each, but leave the magistrate to proceed according to his discretion.

Mr. ROGERS said the position of things was not quite as stated by Mr. Taylor. The magistrate would be ruled by the terms of the Act of Parliament, and from the fact of the company not having appealed against the report of the examiner, they would not be allowed to go into the matter, the report of the examiner being "conclusive evidence" against them. With regard to the complaint of excess of sulphur in the Commercial Company's gas, Mr. Runtz had stated very properly that the explanation given, not by the engineer of the company, but by the chief gas examiner, was sufficient to show that the Board could not proceed against them. Besides, the time for doing so had now expired. With regard to the defective illuminating power, it only occurred on one occasion, and then the gas was but half a candle below the standard. On the question of ammonia he thought Mr. Runtz was right. It appeared in some kind of way that a general disarrangement occurred at the works, of a very exceptional character, and therefore he thought the Board would be doing their duty, and not exercising their power too harshly, by accepting the suggestion made by Mr. Runtz, and proceeding against the company for penalties in respect of one day only.

On the question that the report be approved,

Mr. RUNTZ moved that proceedings be taken in respect of one day only.

Mr. SELWAY objected that Mr. Runtz had already spoken on the question.

Mr. COOK said he would himself move one day, and would name the 24th of September. In doing so he wished to remark that the committee felt, in recommending these proceedings, that unless they did make such a recommendation in this case, they would not be able in future to recommend that any company be proceeded against. The case was so clearly proved before the committee, that unless action were now taken in the matter the Act of Parliament must henceforth remain a dead letter. There was no wish to deal hardly with the company, the only desire was that by the judgment of a competent tribunal, it should be declared that they must in future so look to the management of their works that even accidents were guarded against.

Mr. MUNRO seconded the amendment.

Mr. NATHAN said no previous speaker had mentioned the fact, that the penalty for each offence alleged against the company was £50, so that if the board adopted the recommendation of the committee, they would be proceeding for the infliction of fines to the amount £400. That seemed a very severe course, and he, for one, thought the justice of the case would be entirely met by applying themselves to the offence on one occasion. He had no doubt that the company, who had usually conducted their works in a very admirable way, would take every precaution to prevent a repetition of the complaint.

Mr. RICHARDSON said if the Board were of opinion that to proceed for one day would suffice, he would not recommend the 24th, which was the last day, but the day on which the maximum excess occurred. That was the 17th of September. The quantity of ammonia reported on that day was 6 grains per 100 cubic feet, and deducting 2½ grains, which was the amount allowed, it showed there was then a statutory excess of 3·5 grains. On the 24th of September the ammonia present was 2·9 grains, so that the statutory excess was only 4-10ths of a grain. He did not wish to press heavily on the company if the Board thought they could, with fairness to the public, drop the other days.

Mr. COOK said, after the remarks of the last speaker, he would, with the approval of the seconder, alter the amendment to the 17th, instead of the 24th.

Mr. SELWAY rose to speak, but was ruled out of order, the mover of the adoption of the report having replied.

The CHAIRMAN having decided that the amendment could not be altered from the 24th to the 17th, a show of hands was taken, and the amendment was negatived.

Mr. MUNRO then moved, and Mr. COOK seconded, an amendment to the effect that the company be prosecuted for excess of ammonia on the 17th of September only.

Mr. SELWAY said the proceedings of the honourable member who brought up the report were most extraordinary. Here was a report which had been well considered in committee, and he could not understand how the chairman of that committee could recede from his position, having moved its adoption.

Mr. RICHARDSON said he had not receded; he stood on the report. All he said was that if the Board, instead of adopting the recommendation of the committee, chose to take one day only, let them take the 17th.

Mr. SELWAY said the chairman of the committee, in his reply, used no argument in support of his report, nor did he attempt to refute the arguments of those who would restrict the proceedings to one day. When a question of this kind had been discussed in committee, those members who did not belong to the committee had nothing to guide them, except the report itself and the arguments of the person who brought up the report. He (Mr. Selway) had been prepared to support the committee's recommendation, but as the chairman of the committee gave up that point, he would give it up too, and vote for one day.

Mr. SAUNDERS said he proposed the resolution in the committee because he felt that they had no discretion in the matter; but he now supported the amendment, because the Board had such discretion. The committee had a plain duty before them, and they discharged it, but the Board had the option of saying whether they would adopt the recommendation of the committee in its entirety, or restrict their action to one of the days mentioned.

Mr. H. L. TAYLOR thought the last speaker was wrong in saying that the committee could not exercise a discretion in the matter. It was quite open to them to have decided upon recommending the Board to prosecute for the excess on one day only. Instead of that, they decided to go for the whole eight days, and, strange to say, Mr. Saunders himself proposed that course, and Mr. Cooke seconded it! And now before the Board they both receded from the original proposition, which their own votes and influence carried. He (Mr. Taylor) thought it was the duty of the Board to adhere to the recommendation. Here was a case in which a committee had gone carefully into a question of great public interest, upon which, for the first time, the Board were called to exercise their powers; they had spent much time over it, taking a broad view of it, altogether irrespective of individuals, and now, just because three or four gentlemen from the East-end of London had expressed their opinion that the recommendation of the committee ought not to be carried out to the full extent, the mover and seconder of that recommendation altered their position entirely. It was not right. The Board had the report of the committee, and he, for one, would fix them to the very letter of it. There was no reason assigned for varying it; the matter ought to go before the magistrate for him to deal with as he thought proper. In that way only would the Board be doing their duty.

Mr. FREEMAN said he should vote for the amendment, believing full

justice would be done by proceeding for a penalty on one day. The only desire of the Board was to convince the company that they were determined not to allow them to trifle with the public.

Mr. RICHARDSON said, in committee, he expressed his opinion very strongly that proceedings ought to be taken against the company. Being in the chair, he could not propose anything, but he quite approved of the recommendation that was adopted. Nothing had since occurred to induce him to recede from that position, and all that he had now done was to suggest that if the Board determined to go for one day only, they should take the day on which the maximum amount of impurity existed.

Mr. MUNRO said his amendment would be, that the Board proceed for one day only.

Mr. FREEMAN: Who is to decide which day?

Mr. MUNRO: It should be left in the hands of the solicitor to fix the day.

On the amendment being put to a show of hands, there appeared 15 for it, and 12 against.

Mr. TAYLOR demanded a division, which resulted as follows:—For the amendment, 15; against it, 16.

The amendment was therefore lost, and, on a show of hands, there appeared for the original motion 15, against it 14.

Mr. MUNRO called for a division.

Mr. LESLIE insisted that members who were shareholders in gas companies should not vote. This he said was the most indecent sight he had ever seen in his life.

The division being taken, there appeared for the motion 30, against it 0. The report was therefore adopted.

DR. BARCLAY'S REPORT ON THE GAS SUPPLIED TO CHELSEA.—At the meeting of the Chelsea Vestry on the 2nd inst., the Gas Examiner's quarterly report was read, from which it appeared that the illuminating power of the gas supplied to the district had presented an average, during the past quarter, equivalent to that produced by 13·3 candles, when the gas was burned at the rate of 5 cubic feet per hour in the old burner. The maximum reached 15·2, and the minimum was 12·6. Dr. Barclay added that, considering the increased illuminating power of the new burner, by which the testings are now usually made, he presumed that they could not look for any improvement upon these results for the present.

Dr. Whitmore's report on the illuminating power, pressure, and quality of the coal gas consumed in the parish of Marylebone during August and September, supplied by The Gaslight and Coke Company:—

AUGUST.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon. in 100 Cu. Ft.	Sulphuretted Hydrogn.
	*Mean of 13 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Gas supplied from the Fulham works . .	16·88	17·51	16·30	26·87	8·37	15·70	0·75	No trace
Gas supplied from the Beckton and Bow works	16·66	17·32	16·12	31·77	15·17	10·98	0·45	No trace
Cannel gas supplied from the Pimlico works	20·75	21·50	20·21	26·95	14·32	16·05	0·60	No trace
Mean of daily readings of barometer . . . 29·68								
" " " thermometer . . . 71·91								
SEPTEMBER.	*Mean of 23 Obser							
Gas supplied from the Fulham works . .	16·50	17·04	16·01	21·90	8·42	14·87	0·50	No trace
Gas supplied from the Beckton and Bow works	16·73	17·31	16·04	31·65	15·30	11·60	0·40	No trace
Cannel gas supplied from the Pimlico works	20·63	21·21	19 64	21·30	14·02	15·89	0·60	No trace
Mean of daily readings of barometer . . . 29·89								
" " " thermometer . . . 64·99								

* Each observation consists of ten readings of the photometer, at intervals of one minute.

During the months of August and September the mean illuminating power of the gas supplied from the Fulham works was equal to the light of rather more than 16½ candles; it ranged between 16·01 and 17·51 candles. On eight occasions it exceeded 17 candles, and it will be observed that on no occasion did it fall below the legal standard of 16 candles. The mean amount of sulphur found in 100 cubic feet of gas was, in August, 15·70 grains, and in September 14·84 grains; in both months the ammonia was considerably under one grain. The gas supplied from Beckton and Bow during the two months gave a mean light equal to 16·69 candles; it ranged between 16·04 and 17·32 candles. The mean amount of sulphur found was, in August, 10·98 grains, and in September 11·60 grains; and in both months the ammonia did not exceed half a grain. The cannel gas gave an illuminating power equal to 20·69 candles; it ranged between 19·64 and 21·50 candles. On ten occasions it exceeded 21 candles, and three times it was slightly below the standard. The sulphur in August amounted to 16·05 grains, and in September to 15·89 grains. The ammonia in both months amounted to 6-10ths of a grain. During the whole period the pressure of all the gases was good, and on no occasion was sulphuretted hydrogen detected by the ordinary tests.

METROPOLIS WATER SUPPLY.

SOUTHWARK AND VAUXHALL WATER COMPANY.—At the meeting of the Wandsworth Board of Works, on Wednesday last, the General Purposes Committee reported that, in accordance with the instructions of the Board, they proceeded on Friday, the 14th of September last, to inspect the works of the Southwark and Vauxhall Water Company at Nine Elms, and went thence to the works of the company at Hampton, and on a subsequent occasion—viz., on the 19th of September—the committee went to the offices of the company and there inspected the plans of the water-mains in use by the company, and found at the works at Nine Elms that one of the filter-beds was being cleaned out at apparently very considerable expense, and improvements were being effected there which would more effectually filter the water; but after a careful inspection of those works, the committee came to the conclusion that they ought to be entirely removed from their present position, where they were to a certain extent exposed to a deleterious atmosphere. On inspection of the works at Hampton, the committee were informed that the company had a considerable extent of land there, amounting to some 30 or 40 acres, which could be readily made available for subsiding-tanks and filtering purposes. Having their works all together at the intake would, no doubt, from a purely economical point of view, prove advantageous to the company, the more especially as it would save a second pumping of the water supply, would facilitate the general distribution of the water, and would ensure it being all of an uniform quality. The committee, therefore, urged upon the company the necessity of immediately extending the area of their subsiding-tanks and filtering reservoirs, as repeatedly insisted upon by the Government Inspector, as the only way of ensuring the supply of pure water; and further stated that at the ends of many streets, where there were dead ends to the mains, there was an accumulation of earthy matter, and, in some cases, there were instances of animal life, and they were of opinion that the dead ends referred to should be regularly drawn at short intervals, with a view of removing any such accumulations. It was also reported that the committee did not inspect the works at Peckham, as they were informed by Major Bolton that they did not in any way affect the water supply of the Wandsworth district. In conclusion, the committee reported that, from the inspection of the company's plans before referred to, they had ascertained that a portion of the water supplied within the Wandsworth district—viz., in the lower part of Battersea—could be supplied without first passing through the filter-beds of the company at Nine Elms. That connexion between the mains of filtered and unfiltered water the committee considered highly objectionable. The committee thought it could not be too strongly urged on the public generally to see that their cisterns were regularly and properly cleansed.

Major Bolton reports that the state of the water in the Thames and Lea was not so good during the month of September as it was in the previous summer months. Of the companies drawing their supplies from the Thames, the West Middlesex, East London, and Lambeth have sufficient storeage capacity and impounding reservoirs to avoid taking in water when floods prevail. The Chelsea Company have completed the construction of three out of the four new subsiding reservoirs at Molesey, and the Southwark and Vauxhall and Grand Junction Companies have acquired land for the construction of suitable storeage reservoirs and other works at Hampton. The water in the River Thames at Hampton, Molesey, and Sunbury (where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, Chelsea, and East London Companies are situated) was fairly good during the month. The highest flood state of the river at Hampton during the month was 9 inches above, and the lowest was at the summer level. The condition of the water in the river at Ditton was also good during September. The works of the Southwark and Vauxhall Company are gradually getting into a more satisfactory condition. A special inquiry has been held by the Local Government Board, under section 35 of the Metropolis Water Act, 1871, upon the quality of the water recently furnished by this company.

Dr. Whitmore's report on the composition of Thames companies and other waters supplied to Marylebone during August and September:—

AUGUST.	In Grains, per Gallon.			In Parts, per Million.		In Degrees.	
	Total Solid Matter.	Loss by Incineration.*	Chlorine.	Free Ammonia.	Albuminoid Ammonia.	Hardness.	Hardness after boiling Fifteen Minutes.
West Middlesex	18·40	0·80	1·10	0·01	0·07	12·4	2·3
Grand Junction	18·56	0·88	1·88	0·01	0·07	12·5	2·4
SEPTEMBER.							
West Middlesex	16·80	0·80	1·16	0·01	0·08	11·7	2·1
Grand Junction	20·00	0·96	1·18	0·00	0·08	13 6	2·5

* The loss by incineration represents the amount of organic and other volatile matters contained in the Imperial gallon (70,000 grains) of water.

The water supplied to the parish during August and September by both the Thames water companies was clear and bright, and perfectly free from either taste or smell. Examined by the microscope, neither dead nor living organisms could be detected.

The Registrar-General publishes the following returns of the average daily quantity of water supplied by the London Water Companies during the month of September. According to these, 128,412,301 gallons, or 583,436 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight), were supplied daily; or 239 gallons (108·6 decalitres) rather more than a *ton* by weight, to each house, and 33·7 gallons (15·3 decalitres) to each person, against 32·6 gallons during September, 1876.

COMPANIES.	Number of Houses, &c., supplied in		Aver. Daily Supply of Water in Gallons* during	
	Sept., 1876.	Sept., 1877.	Sept., 1876.	Sept., 1877.
Total supply	529,628	537,039	122,421,732	128,412,301
From Thames	249,357	252,518	64,672,576	64,050,489
" Lea and other Sources . .	280,271	284,521	57,749,156	64,361,812
THAMES.				
Chelsea	28,675	28,741	8,606,800	8,972,100
West Middlesex	48,440	49,821	10,586,545	10,060,392
Southwark and Vauxhall . . .	80,600	79,000	19,200,000	19,450,000
Grand Junction	36,616	37,683	11,126,368	11,466,797
Lambeth	55,026	57,273	15,152,863	14,101,200
LEA AND OTHER SOURCES.				
New River	124,785	125,897	25,138,000	28,153,000
East London	110,354	113,192	25,233,600	28,600,650
Kent	45,132	45,432	7,377,556	7,608,162

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for September, 1877, as compared with that for the corresponding month of 1876, shows an increase of 7411 houses, and of 5,990,569 gallons of water supplied daily.

Dr. Frankland reports, as the result of his analysis of the waters supplied to the Metropolis and some of its suburbs during September, that, taking unity to represent the average amount of organic impurity in a given volume of the Kent Company's water during the last nine years, the proportional amount of such impurity in an equal volume of water supplied by each of the other companies, and by the Tottenham Local Board of Health, was:—Tottenham 0·4, Kent (Deptford Wells) 0·8, Kent (Crayford Well) 0·8, New River 1·0, East London 1·9, Colne Valley 2·0, Grand Junction 2·7, West Middlesex 2·8, Chelsea 3·9, Lambeth 4·4, and Southwark 4·8. The water drawn from the Thames by the Chelsea, West Middlesex, Southwark, Grand Junction, and Lambeth Companies was much more polluted by organic matter in September than in July and August. The water delivered by the Grand Junction Company was turbid, owing to inefficient filtration. The remaining Thames water was efficiently filtered; but that supplied by the Lambeth and Southwark Companies was distinguished by

containing a large proportion of organic matter, some of which was of animal origin. The water from the Lea supplied by the New River and East London Companies was of much better quality, and was efficiently filtered before delivery. The water drawn from deep wells by the Kent and Colne Valley Companies, and by the Tottenham Local Board of Health, was palatable, wholesome, and of most excellent quality for dietetic purposes. That supplied by the Colne Valley Company was softened by Clark's process, and was therefore suitable for washing. That portion of the Kent Company's supply obtained from their deep well at Crayford was slightly turbid, owing chiefly to the presence of minute particles of chalk. Seen through a stratum two feet deep, the water supplied by the Kent (Deptford Wells), Colne Valley, and New River Companies, and by the Tottenham Local Board of Health, was clear and colourless, that delivered by the Kent Company from their well at Crayford slightly turbid and colourless; the East London water clear and very nearly colourless, the West Middlesex clear and very pale yellow, the Chelsea clear and pale yellow, the Southwark and Lambeth clear and yellowish brown, and the Grand Junction turbid and yellowish brown.

Results of Analysis expressed in Parts per 100,000.

Companies or Local Authorities.	Total Solid Matters.	Organic Carbon.	Organic Nitrogen.	Ammonia.	Nitrogen, as Nitrates and Nitrites.	Total combined Nitrogen.	Chlorine.	Total Hardness.
Inner Circle.								
Thames—								
Chelsea	28·74	·190	·043	0	·213	·256	1·45	18·9
West Middlesex	26·24	·127	·038	0	·162	·200	1·40	18·0
Southwark and Vauxhall	29·04	·228	·053	0	·195	·248	1·35	19·7
Grand Junction	27·16	·130	·031	0	·165	·196	1·45	18·3
Lambeth	29·20	·215	·042	0	·207	·249	1·45	19 9
Other Sources—								
New River	25·70	·049	·010	0	·211	·221	1·55	18·1
East London	26·40	·092	·022	0	·140	·162	1·70	18·3
Kent	44·00	·039	·007	0	·430	·437	2·45	28·6
Outer Circle.								
Kent	35·34	·038	·011	0	·506	·517	1·95	25·7
Colne Valley	12·34	·100	·016	0	·343	·359	1·35	4·4
Tottenham Local Board	46·52	·015	·009	0	·439	·448	3·15	25·7
Corporation of Birmingham*	21·90	·321	·048	·002	·192	·242	1·40	12·6
Corporation of Glasgow†	4·24	·161	·009	0	·002	·011	·70	·6

* Analyzed by Dr. Alfred Hill, Medical Officer of Health and Analyst to the Borough.
† Analyzed by Dr. E. J. Mills, F.R.S., of the Andersonian University, Glasgow.

Note.—The numbers in the analytical table can be converted into grains per imperial gallon by multiplying them by seven, and then moving the decimal point one place to the left. The same operation transforms the hardness in the table into degrees of hardness on Clark's scale.

MIDLAND ASSOCIATION OF GAS MANAGERS.

A Meeting was held at the Midland Hotel, Birmingham, on the 11th inst., for the purpose of forming a District Association of Gas Managers.

Mr. Hunt, of Birmingham, occupied the chair, and there was a good attendance, among those present being—

Mr. R. O. Paterson	Cheltenham.
„ J. Deakes	Worcester.
„ J. Annan	Wolverhampton.
„ J. Tindall	Walsall.
„ T. Collett	Dudley.
„ W. Winstanley	Newcastle-under-Lyme.
„ S. B. Darwin	Shrewsbury.
„ J. Darwin	Longton.
„ P. Simpson	Rugby.
„ J. Storer	Stafford.

&c., &c.

In the course of his opening remarks, the Chairman observed that Birmingham appeared to be peculiarly suited to be the centre for a gathering of gas managers, seeing that, apart from its historical associations—for it was at Soho, near Birmingham, that gas lighting was first introduced—in the immediate vicinity was manufactured almost every conceivable appliance necessary for the most complete system of gas lighting, from the retort down to the very burner, and one of the many ways by which an Association could be made eminently useful to its members would be by means of organized visits to some of the important manufactories with which the neighbourhood abounds.

In the course of the proceedings, a message was received from the President of the British Association of Gas Managers, wishing solid success to the infant Association.

The following resolutions were unanimously adopted:—

1. "That it is desirable to form a District Association, to be called the 'Midland Association of Gas Managers,' and this meeting pledges itself to support the same."
2. "That the Association consist of engineers or managers of gas-works, in the service of corporations or gas companies."
3. "That the management of the affairs of the Association be confided to a committee, to consist of a president, treasurer, honorary secretary, and six members."

The following officers were then elected for the ensuing year:—

President—Mr. Charles Hunt.
Treasurer—Mr. Peter Simpson.
Honorary Secretary—Mr. John Tindall.
Committee—Mr. R. O. Paterson, Mr. S. B. Darwin, Mr. W. North, Mr. J. Annan, Mr. T. Collett, and Mr. J. Deakes.

It was decided to hold the future meetings of the Association in Birmingham, on ironmasters quarter-days, and the committee were instructed to arrange a set of rules, and submit the same to the members at the next meeting.

Votes of thanks to the chairman for his conduct in the chair, and to the honorary secretary for his exertions in promoting the Association, terminated the proceedings.

Proposed Water-Works Extension at Barnsley.—At the meeting of the Barnsley Town Council, on the 9th inst., the proposal to apply to Parliament next session for additional powers, rights, and privileges with reference to the better supply of water, and for obtaining an increased watershed, and powers, rights, and privileges to construct additional reservoirs, conduits, and other works, and to raise more money and extend the limits of supply, and pay the costs, charges, and expenses preliminary and incident to promoting the said application out of the general district rate of the borough, was submitted for confirmation. On the first occasion of its being made, 14 voted for the resolution, but now only 12 recorded their votes in its favour, so that the corporation cannot apply to Parliament, they not having obtained a clear majority of the council, which is composed of 24 members.

VISIT OF THE CIVIL AND MECHANICAL ENGINEERS SOCIETY TO THE SOUTH METROPOLITAN GAS-WORKS.

(FROM A CORRESPONDENT.)

On Saturday, the 6th inst., the members of the above Society paid their last visit to works for the present session. Assembling at the gas-works in the Old Kent Road, they were courteously met by Mr. G. Livesey, Memb. Inst. C.E., the engineer, and his brother, Mr. Frank Livesey, both gentlemen kindly showing them through the works, and explaining the various apparatus and processes of gas manufacture.

The works, like many others of the kind, were started in a small way, on a narrow strip of land adjoining the canal, whereas the company have now an area of about 35 acres, which is being rapidly covered. Some idea of its importance may be gathered from the fact that the district supplied with gas covers 13 square miles, and requires 180 miles of street-mains.

The inspection commenced with the retort-house, where the charging and drawing the retorts were described and illustrated. After passing the condensers, the visitors were shown some washing apparatus (Mr. Livesey's patent), in which the gas, being finely divided by passing through small holes in perforated plates, and then ascending through weak liquor, parts with much of its impurity. Another and improved washer was being fitted up, by means of which it is expected the whole of the ammoniacal impurities may be extracted without the use of the ordinary scrubbers. Much interest was manifested in the gasholders and tanks, the largest holder (180 feet diameter, with a capacity of 2,200,000 cubic feet) being constructed without any internal trusses or bracing; the cover or crown, when empty, being supported on a timber staging erected in the tank; but the most remarkable feature, and one showing the boldness and sound judgment of the engineer, was the tank, 184 feet diameter and 47 feet deep, constructed entirely of concrete, without either brick lining or puddle-backing. This tank is, in all probability, destined to be the pioneer of many similar constructions.

Another striking example of the use of concrete was seen in the new retort-houses in course of construction. The floor being raised 10 feet above the level of the ground, is carried by piers and concrete arches 21 feet span, rising 1 foot 9 inches in centre, 18 inches thick at the crown.

Many other new and interesting points of construction and arrangement were pointed out during the very pleasant visit.

The present capacity of the works is 5 million feet per diem, but the estimated capacity, when the projected extensions are completed, will be more than doubled.

Experiments are being conducted, in various parts of the works, with the object of improving the manufacture, showing that gas managers are fully alive to the necessity of obtaining the best possible results from all available means.

Among the members present were the President, Mr. R. M. Bancroft; treasurer, Mr. W. C. Skeet, Assoc. Inst. C.E.; Messrs. P. Burrell, Memb. Inst. C.E.; H. Ellis Hill, Assoc. Inst. C.E.; Alex. Payne, Assoc. Inst. C.E.; R. Finlayson, &c.

The next session of the society, for the reading and discussion of engineering papers, will commence in December.

DARLINGTON CORPORATION GAS SUPPLY.

At the Meeting of the Darlington Town Council, on the 4th inst., the Town-Clerk presented the report of the Gas Committee. It stated that at the meeting of the committee on the 26th ult., the following letter was received and ordered to be entered on the minutes:—

The Metropolitan Gas Referees, 17, Buckingham Street, Adelphi, W.C., July 28, 1877.

Dear Sir,—By favour of the introduction kindly given by you, I saw Mr. Sellars at York, who received me very courteously, and gave me all the information I desired. If it is any satisfaction to you, I have pleasure in putting on record that, having occasion to be in Darlington, I took the opportunity of testing the gas supplied to the town for "sulphur compounds other than sulphuretted hydrogen." I tried it in the town, as well as at your works, and found it to contain only 11 or 12 grains of sulphur per 100 cubic feet of gas. As the quantity we allow in London is only 20 grains, I consider this degree of purity very satisfactory.—Faithfully yours,

William Pole, F.R.S.,
One of the Metropolitan Gas Referees under the Gas Acts of 1868 and 1876.

W. Smith, Esq., Manager of the Gas-Works, Darlington.

Mr. Kitching, in moving the adoption of the report, stated that the letter from the Referee was spontaneous on his part. He wrote it to the manager, but the committee thought it was only proper that it should be brought before the council, so that they should see what state the gas-works were in. He had great pleasure in stating that the past half year had proved favourable. The profit upon the gas-works during the half year ending the 30th of June was £2670 9s. 7d. The committee had paid interest amounting to £1702 0s. 3d. He should explain that out of this they had allowed interest upon unproductive capital to the extent of £400 or £500, and over and above that they had remaining £968 9s. 4d. for liquidation. He hoped the council would consider that the committee had done pretty fairly, so far as the last half year was concerned; and as to the quality of the gas, it was as good now as they had ever known it. It had been tested that day, and he believed it was something equal to eighteen sperm candles; so that, supposing gas was burnt at the rate of from 5 to 6 feet per hour, it would have the illuminating power just mentioned. That would be satisfactory to all present, and he hoped no one would say but that the gas was extremely good. The profit made upon the year, from July to June, had been £5652 11s. 3d. Not only had the interest been paid, but the committee had charged themselves with a large sum on unproductive capital, which they had never done before. The quantity of gas made during the half year ending June, 1876, was 58,029,000 cubic feet; the gas made during the corresponding half year of 1876 was 61,384,000 feet, there being thus an increase in the latter period of 2,555,000 feet. The committee, therefore, were, in reality, improving. The new gasholder, which was opened a few days ago, was capable of holding 400,000 cubic feet, so that they would be better supplied with gas than they had hitherto been. So far as the price of coals was concerned, taking an average of the two kinds used, it was something like 12s. 4d. per ton. They all knew that, in consequence of their new works, their capital account had increased to £88,402 3s. 2d. Altogether, he was glad to say the gas-works were in a satisfactory state.

The minutes were adopted.

Price of Gas at Bradford.—At the meeting of the Bradford Town Council, on Tuesday last, in answer to questions, Alderman Shepherd said there was no intention to lower the price of gas or to make any change, and, so far as Bradford was concerned, the gas was of such good quality that it was not dear when compared with some other towns, and he trusted that no attempt would be made to supply gas cheap and nasty.

Tunbridge Wells New Gas-Works.—The following were tenders for 400 feet in length of iron roofing, covering retort-house and coal-store, and two high-service water-tanks for the above works, as designed by Mr. R. P. Spice, of Westminster:—Abbott and Co., Gateshead, £5100; Horsley Iron Company, Tipton, £5000; Cutler and Sons, Millwall, £4497; St. Pancras Iron Company, London, £4452; Cockey and Son, Frome, £4100; Head, Wrightson, and Co., Middlesbrough (accepted), £3900.

MANCHESTER CORPORATION NEW GAS-WORKS.

The foundation stone of the new gas-works, to be erected near Philip's Park, was laid on Wednesday, the 10th inst., by Alderman Hopkinson. We extract from the city papers of the subsequent day the following report of the proceedings, and the interesting particulars respecting the development of the corporation gas undertaking of late years.

On the invitation of the Gas Committee a large number of gentlemen, chiefly members of the City Council, assembled at noon at the new town-hall. After inspecting the offices of the gas department, the company were conveyed in a number of vehicles to the Gaythorne Gas-Works, over which they were conducted by Alderman King (the chairman of the Gas Committee), and by several members of the committee. From hence the company proceeded to the Rochdale Road station. At these works Foulis's Hydraulic Stokers are in practical operation, and their working was watched with much interest. The street-mains stores at Poland Street were next visited. After inspecting the stores the company were shown the means by which main-pipes are tested before being accepted from the contractor by the corporation. They were then driven to the site of the new works, the main features of which were explained by Alderman Hopkinson, chairman of the New Works Sub-Committee. For the purpose of the ceremony, a platform had been erected at the river end of one of the cannel sheds, and here it was that the stone was laid.

The proceedings were commenced by Alderman KING stating that they were met to lay the foundation stone of a very important work connected with the corporation. The works had been in hand for more than two years, and they were now sufficiently far advanced to enable them to perform that ceremony. The committee were fortunate in having amongst them gentlemen peculiarly qualified for the work of which they had charge, and they had been favoured particularly in having in their ranks Alderman Hopkinson, who had great talent for engineering, and who gave his valuable services gratuitously to the corporation. They had succeeded in inducing him to act as chairman of the sub-committee, and he (Mr. King) had to ask him to lay the stone that day, and for that purpose he presented him with a silver trowel and mallet.

A bottle containing the Manchester daily newspapers, coins, &c., having been placed in the cavity by Alderman King, the stone was laid by Mr. Hopkinson in a very skilful manner, and amidst applause.

Alderman HOPKINSON then addressed the meeting, and, in the course of his remarks, said that the corporation, in purchasing a large plot of ground, obtained the facility of being able to build by instalments, as the demand for gas might increase. In the case of the other stations, whenever the committee wished to make alterations they had to be continually purchasing land at a great expense. That expense, however, could not occur in connexion with the new works, for the committee had obtained land sufficient for any alterations or extensions they might wish to make in years to come. In providing large works like those, however, a great expense was incurred in paying interest on the dead capital. The committee expected that the scheme would make adequate provision for the next 40 or 50 years, but meanwhile the cost incurred by way of interest, in purchasing land in anticipation of the future, would be pretty nearly covered by the brickmaking which would be carried on upon it. It was expected that they might be able by next winter to get in a gasholder, but he was afraid their expectation would be doomed to disappointment. If they were able to manufacture gas at these works in three years from now, he thought they would have done extraordinarily well. Meanwhile, they were endeavouring, in every possible way, to increase the productiveness of the present works, so as to get over the difficulties with which they were usually harassed at Christmas.

The MAYOR (Alderman Heywood) said he had a strong recollection of the building of the first gas-works in Gould Street, Rochdale Road; and 14 years ago he had the privilege accorded to him by the Gas Committee of laying the foundation stone of the works at Gaythorn. When it was decided to erect these works in the position at Bradford, many difficulties had to be encountered, one of which was the feeling in the minds of some members of the council that the introduction of the works into that district would be seriously injurious, not only to the public park, but to the public generally. If they were not now unanimous on the subject, he thought they were very much obliged to those gentlemen who, holding opinions antagonistic to the construction of those works in that neighbourhood, had not raised an objection to the Gas Committee at once commencing the great work which they had inaugurated that day. He thought the Gas Committee were fairly entitled to their thanks for what they had shown them that day, and he called for cheers for the committee, which were heartily given.

The proceedings then terminated.

In the evening the Gas Committee entertained a number of guests in the banqueting room of the town-hall, to celebrate the event of the day—Alderman KING presiding.

The MAYOR, in responding to the toast of his health, said it happened that he was very early connected with the Manchester Gas-Works, and he could not refer to their history without calling the attention of members of the council to some of the gentlemen who had presided over the deliberations of the Gas Committee. There was one gentleman whose memory was entitled to their deepest and strongest sympathy, and who, as chairman of the Manchester Gas-Works Committee, exhibited a desire that the works should be continued for the benefit of the inhabitants of the city—he referred to Alderman John Shuttleworth. Following him came Alderman Curtis and Alderman Crewdson, both of whom discharged their duties with great ability. The next chairman of the committee was Alderman King. These four gentlemen had presided over the committee for a period of 40 years. Whilst the committee were to be congratulated on the result of their efforts, they were not wholly free from faults. He thought that when the Stretford Gas-Works were offered, and the terms accepted by the council, the committee made a mistake in refusing to confirm the purchase.

The CHAIRMAN explained that the Gas Committee approved of, but the council refused to confirm the purchase.

The MAYOR, resuming, said the blame must then be attached to the council. It very rarely happened that the council refused to accept a well-digested report from a committee, and if such report were presented, and refused by the council, he was persuaded that the fault would be more with the committee than with the council. He was glad to hear that under the present management they were going to have a reduction in the price of gas, and that a considerable sum would also be paid by the committee for improvements in the city. He concluded his remarks by proposing the health of Alderman King, the chairman of the Gas Committee.

The CHAIRMAN, in acknowledging the toast, said gas was first introduced in Manchester in 1807, when the Police Commissioners placed a gas-lamp over the police office, in Police Street, off King Street. Shortly afterwards gaslight was extended to the whole of the building occupied by the commissioners; and subsequently, some few of the street-lamps in the most frequented thoroughfares were lighted by gas-lamps. The obvious advantage of these lamps attracted public attention, and the result was that a number of meetings were held in Manchester, at which the commissioners were asked to take steps for the more extended use of gas. The outcome of those meetings was that the commissioners called a special meeting of the ratepayers in order to get their sanction to the making of such a provision. That meeting was held on April 13, 1817. It was then unanimously resolved that it would be expedient to adopt the proposed mode of lighting the central parts of the town with gas, and, for the purpose of effecting this object, to raise the police-rate from 1s. 3d. to 1s. 6d. in the pound. This might be considered as the real starting-point of the Manchester Gas-Works. He did not know where, from 1807 to 1817, they manufactured the gas; but in the latter year the commissioners purchased the plot of land in Water Street, which was now the site of the A Division police station, and on which they erected retorts, holders, &c. They commenced supplying the town with gas-lamps in substitution for the oil-lamps; but the cost became so large for the works, that, seeing the limited power of levying a police-rate, it was deemed expedient to supply gas to shops and other premises, and at prices which should be, at the same time, beneficial to the common fund. The price at that time was fixed at 14s. per 1000 feet. Considerable doubt had been thrown upon the legality of the proceedings of the commissioners in manufacturing gas, and, in 1823, they were threatened with an action. To remedy this an Act was applied for, and it obtained the Royal Assent on June 24, 1824; and thus Manchester was the first town that ever obtained powers to use its capital as a trading company, especially in making gas. In 1828 the price of gas was reduced to 12s. per 1000 feet, and since then the gas-works had continued, without any question of propriety, the property of the corporation. In 1824 the commissioners purchased the land for the Rochdale Road works; and, in 1837, the works at Gaythorn were purchased from Mr. Fernley. These were the only works of a private character for the manufacture of gas that ever existed in the city. In 1843 the works were transferred to the corporation; and, in 1867, the Droylsden Gas-Works were purchased by the corporation. In reference to the mayor's statement that it was through the fault of the Gas Committee that the Stretford Gas-Works were not now the property of the corporation, he (the chairman) wished to explain that the negotiations were conducted by the Gas Committee, and terms agreed upon, but the council did not see fit to endorse their action, and the project fell through. After the purchase of the Droylsden Gas-Works the corporation had neither purchased nor erected new works. The capital invested by the committee in plant at their various works was £853,000, and the quantity of cannel used each year was 210,000 tons. The capital was in the proportion of £4 1s. 3d. per ton of coal carbonized. The whole of the profit of these works now came to the aid of the ratepayers, and was paid over to the Improvement Committee. The amount paid over in the past year was £42,132. This profit would have gone into the pockets of the ratepayers, if they had not got it in the shape of remission of rates, because, if they had not received it in the shape in which it was paid, an improvement-rate of 4d. or 5d. in the pound would have had to be laid. Up to 1843 the profit realized was £304,000, and from that time, when the corporation took possession of the gas-works, to the present, the committee had paid to the Improvement Committee £1,060,075. That was a satisfactory item for the ratepayers of Manchester to have saved, for, if it had not been for those profits they would have had to raise every penny by rates. But, beyond this, the ratepayers now possessed property in the gas-works, even taking them at a depreciated value, worth £483,599, over and above the debt of £379,109 which the committee owed. During the last three years especially, when the profits had been large, the committee had given gas consumers the benefit of the extra profit they had earned above 10 per cent. Two years ago they reduced the price of gas 2d. per 1000 feet, and, in regard to the present year, they felt perfectly justified in recommending the council to make a reduction of 4d. per 1000 for the inside and outside districts, thus bringing down the price inside the city to 3s., and to 3s. 6d. in the outlying townships, and to 4s. for some districts beyond the Mersey. The total reduction in price during the last few years represented a sum of £56,000 a year that the gas consumers had been relieved of.

Several other toasts followed, amongst them that of "The Chairman of the New Works Sub-Committee," which was proposed by Alderman CURTIS, and responded to by Alderman HOPKINSON.

From the *Manchester Guardian*.

The citizens of Manchester are the proprietors of three separate gas-works, two of great extent. The works in Rochdale Road are, with the exception of one or two of the London works, the largest in the kingdom; the works in Gaythorn are little less important; but the Droylsden works, which were taken over eight or nine years since from a public company, are comparatively small. Dealing first with the works in the aggregate, some idea of the extent of the operations carried on by the committee may be obtained from a consideration of the results of a year's working. We find, then, that in the twelve months ending with June last, the corporation paid for cannel, which may be said to be the only material used in the manufacture of gas, no less a sum than £176,828. Other smaller items for purifying material, &c., may, for our present purpose, which is to show the actual work done by the department, be left out of consideration, and it is not intended to enter into the question of the cost of labour. Taking, then, the sum of £176,828 as the cost of the material going into the works, what was the value of the products extracted from it? First, we have the enormous sum of £333,740 paid by the citizens during the twelve months for gas-rents, including £20,000, charged for the lighting of the city, and a much smaller item for meter-rents. To put it more plainly, the manufactured gas is alone worth about double the value of the material from which it is extracted. But there are other products from the retort also valuable besides carburetted hydrogen. In the same year there was a production of coke, which sold for £21,740, of tar to the value of £21,082, and of ammonia water to the value of £14,872, or in the total products of the value of £391,434. Allowing for the cost of material and for working expenses, the Gas Committee netted in the twelve months the very handsome sum of £100,539. It does not follow as a matter of course that the committee are entitled to any great credit for achieving so much. Their profit will, of course, depend very largely upon the price at which gas is sold to the ratepayers, and it is only fair to state that, in the period to which the figures relate, we were paying 1d. per 1000 cubic feet more than at present. During the earlier part of the year the price of gas in the city was 3s. 6d. per 1000 feet, and in the latter half of the year 3s. 4d., as now. It had previously been as low as 3s. 2d. per 1000 feet; but the rise in the price of coal in 1873 was so serious that the committee were obliged to increase their rates in proportion. Last year, however, the rates charged were still well under those charged in other towns, and the committee may take credit for earning their profit whilst making a considerable sacrifice in the interests of the ratepayers. Such, briefly stated, are some of the results of a single year's working of the gas department. But there is another side of the question which deserves a moment's attention. It is obvious that operations of such magnitude cannot be carried on without affording employment to a large body of workmen. In the three works under the control of the committee nearly 1000 persons are employed, and to these must be added a staff of 120 clerks, inspectors of meters, and collectors of rentals, who do the administrative work of the department. The benefits flowing from this extensive employment of

labour only need suggestion, and will go without further comment. To trace more clearly the extent of the committee's operations, it is necessary to revert to a somewhat early period of the present century. It was in the year 1817 that the Manchester Gas-Works were first established by the townspeople, by means of money borrowed on security of the rates and of the works; the works being, we believe, taken over from a public company. We have no data showing the capacity of the works as first established, and it is not until 1844, when both the Rochdale Road and Gaythorn stations had been at work for some years, that we come upon accurate figures. The total production of gas in the twelve months ending June, 1844, was 248 million cubic feet, the price per 1000 feet being 6s. From this date we have year by year a marvellously rapid increase of production, and, on the other hand, a gradual reduction of the price of gas to the ratepayers. Take, for example, a comparison by decades. In 1847, with the price still at 6s. per 1000 cubic feet, the total production of gas reached 332 million cubic feet; in 1857, with the price at 5s., the production was 611 millions; in 1867, with the price at 3s. 2d., the production amounted to 1217 millions; and in the year ending June last, with the average price at 3s. 5d. per 1000 feet, the production had risen to 2070 million cubic feet of gas. During this latter period the number of individual consumers had risen to the enormous figure of 71,678, and the area of distribution extended to 42 square miles. These are some of the facts which the Gas Committee may very properly urge in reply to the question as to what they have been doing for the citizens. The Manchester Gas-Works have now a history of 60 years. Established originally on the outskirts of the city, they have come, by the natural growth of Manchester, to be almost within its very centre. They occupy large and valuable sites, and if they were put into the market now would realize upwards of £800,000. Last year there was a mortgage debt on the property of £405,500, and the committee held an excess of assets amounting to £455,869. The value of the street-mains alone, of which there are 545½ miles, was put down at £263,111.

But to come to detail. A description of the operations of the committee will help to a due appreciation of the immense development of local government, as well as to a knowledge of the difficulties with which they are surrounded. Taking first the Rochdale Road station, as being the largest of the three works under the control of the Gas Committee, we meet with some remarkable figures. The works stand upon nine acres of land, and are valued in the annual accounts of the corporation at £225,451. The four retort-houses contain 1100 mouthpieces, or, say, 550 separate retorts, which are capable of producing, from 600 tons of cannel, 6 million cubic feet of gas per day. Seven gasholders store 4,547,000 cubic feet of gas, one holder alone having a capacity of 1,612,000 feet. The station-meters, which register the quantity of gas produced in the works, have a total measuring capacity per 24 hours of 5,400,000 cubic feet, and there is storeage room on the premises for 25,000 tons of cannel, 6000 tons of coke, and 320,000 gallons of tar and ammonia water. Compare some of these figures with those given on a plan of the works as they existed in 1825. There was then a single retort-house, with seven single settings of retorts, two small purifiers, and one gasholder, capable of containing 56,000 cubic feet! By the year 1843 the works had received considerable extensions, so as to comprise 370 retorts, four sets of purifiers, and three gasholders. Latterly the rapid increase in the demand for gas and improved methods of manufacture have necessitated the gradual reconstruction of the works, and there is now little trace of the apparatus in use some 20 or 25 years back. In describing the operations of the works, it will be convenient to speak of the various processes of manufacture in the order in which they occur. The works are divided into two unequal parts by the Lancashire and Yorkshire Railway. On the town side of the line are all the works proper, the Newtown Yard containing only two new gasholders of vast proportions, to which reference will be made presently. The cannel arrives at the goods station of the Lancashire and Yorkshire Company, adjoining the gas-works, in quantities of about 50 trucks per day. A line of rails crossing Rochdale Road on the level connects the goods station with the works. The cannel is removed from the sidings to the works by a locomotive engine belonging to the corporation, a few trucks being taken at a time, so as to offer the least possible obstruction to the passage of the thoroughfare. Once on the staging above the stores, the cannel is tipped with great expedition. The waggons, which are fitted with end doors, are raised at one end by a steam crane until the material slides out at the other, the process of emptying being effected in about a couple of minutes. To guard against any difficulty arising from strikes among colliers, or other circumstances which might interfere with the supply of cannel, the space available for storeage is very extensive, being sufficient for six weeks maximum consumption. Near the stores are experimental works—practically gas-works in miniature—performing all the operations of carbonization, condensation, scrubbing, purification, measuring, storing, and testing. Here the cannels drawn from the Lancashire, Yorkshire, Derbyshire, Nottinghamshire, and Welsh coal-fields are tested to see that they are of the quality contracted for, the works being used also in the first instance to ascertain the actual value of samples submitted for purchase. The corporation profess to produce, at each of their stations, 20-candle gas, and we have it on the authority of the officer of health that during the year 1876 the average illuminating power of the gas was equal to 19·13 London standard sperm candles, burning at the rate of 120 grains per hour each. To obtain this average of gas it is necessary to mix the cannel with coal before putting it into the retort. The proportion of added coal is carefully regulated according to the quality of cannel used, some cannels affording very little more gas than a superior coal. Speaking generally, the mixture thrown into the retorts is in the proportion of about 25 per cent. of coal to 75 per cent. of cannel, this being found to produce the required illuminating power of gas.

After describing in considerable detail the processes of carbonization, purification, &c., the writer from whom we quote refers to the gasholder capacity at the three stations. At Rochdale Road, he says, there are seven holders, which together store about three-quarters of a winter day's supply. They are all on the telescope principle, two in the Newtown Yard having three lifts each. These latter are of enormous capacity, and are the only triple-lift holders known to us. The largest of the two is 153 feet in diameter, 90 feet high, and, as already mentioned, will store no less than 1,612,000 cubic feet of gas. The only matter now remaining for notice is the manner of distribution. At Rochdale Road the gas is drawn from the holders as required, and discharged into six leading mains, named according to the districts they supply—namely, Openshaw, Bradford, Newton Heath, Rochdale Road, Cheetham Hill, and Market Street. The pressure at which the gas passes into the mains is regulated by a series of governors, stationed in the meter-house. A governor is attached to each main, and the gas entering the governor at a variable pressure is discharged into the main at a constant and invariable pressure. The remaining portion of the works consist principally of boiler-houses, mortar mills, tar and liquor tanks, joiners and mechanics workshops, smithy, workmen's dining-room, stores, and spacious offices. These latter include a committee-room, manager's office, drawing and general offices, and excellent laboratories, in which the manager (Mr. Braddock) and his assistants conduct the required experiments to maintain the average illuminating power of the gas, and to detect the presence of any undue amount of impurity. The results of these experiments are regularly and carefully recorded.

We have now completed a very rapid sketch of most extensive operations, and it is only necessary to add a few general particulars as to the works. Reference has been made to the formidable nature of the appliances demanded in the production of coal gas. Everything is on a correspondingly immense scale, and it does not decrease the impression which the observant visitor must carry away with him to be told that there are in the works as many as 15 boilers supplying the motive power to 22 engines. By the adoption of mechanical stoking, about 110 men have been dispensed with, but there are still employed in the works during the winter months as many as 450 persons. As the hot season approaches, the numbers are gradually reduced, until at Midsummer only about 250 men remain. Since the introduction of hydraulic machinery, horses have been employed in the work of conveying the cannel to the "charger," and stabling accommodation for 14 animals is just upon the point of completion.

The Gaythorn station, as being the second in point of importance, as well as the oldest, next demands attention. It occupies a superficial area of upwards of eight acres, and is valued in the books of the corporation at £164,713. There are two retort-houses, containing 780 mouthpieces, or, say, half that number of separate retorts. These retorts are estimated to carbonize 476 tons of cannel per 24 hours, or to produce a daily supply of 4,760,000 cubic feet of gas. Six two-lift gasholders find storeage-room for 3,093,000 cubic feet of gas, the largest of the six having a capacity of 813,870 cubic feet. The works are much less crowded than are those in Rochdale Road, and there is ample yard space. The Manchester South Junction and Altrincham Railway forms the boundary of the works on the north, and a series of overhead sidings brought into the works from the line afford unusual facilities for the rapid delivery of material. There is storeage room for 23,000 tons of cannel, for 8000 tons of coke, and 736,000 gallons of tar and ammonia water. The different processes pursued in the manufacture of gas are, of course, those described above, but there are some little variations in the order and in the agents employed which are worthy of mention. In the first place, the process of condensing, or cooling the gas, follows the process of exhausting, and is here effected in a number of circular chambers, in outward appearance precisely similar to the adjoining scrubbers. A huge condenser on the plan of that at Rochdale Road is, however, about being completed, and will soon be brought into use, when the order of the processes will be reversed. Again, the material used in scrubbing is timber and not coke, the result being much the same in both cases. With the view of doing away with all complaints as to the quality of the gas supplied, the corporation are now engaged in erecting two terminal purifiers through which the gas, after it has undergone all the previous processes, will be passed before being sent to the holders, and it is hoped that it may by this means be actually cleared of every grain of impurity. A feature of the works is its very handsome meter-house, said to be the finest in the country. The house is very lofty, and is covered with an iron and glass roof. It contains four meters, with a measuring capacity of 5,760,000 cubic feet in the 24 hours. Two of the meters, which will each register 100,000 cubic feet per hour, are exceptionally fine ones. There are admirable laboratory arrangements here, as at Rochdale Road, and we understand that it is proposed by-and-by to introduce into the works the hydraulic stoking machinery which is so conspicuous a feature of the larger station. At present the work is all done by hand, and the station, by consequence, employs a proportionately large number of workmen.

The Droylsden station, taken over from a public company about eight years back, is comparatively small, and cannot in any sense compare with the extensive undertakings described above. The works stand on upwards of an acre of ground, and are set down in the books of the corporation at a value of £12,351. A single retort-house of 24 mouthpieces is able in 24 hours to carbonize 16 tons 16 cwt. of cannel, producing 168,000 cubic feet of gas. The gasholder has a storeage capacity of 82,000 cubic feet, and the single station-meter registers 360,000 feet per day. There is storeage room on the premises for 600 tons of cannel, 1000 tons of coke, and 10,000 gallons of tar and ammonia water.

The writer proceeds to offer some particulars of the new works at Bradford, which are to equal in cost a new town-hall. First as to the necessity of the works. It is about six years, he remarks, since very important extensions were made at the Rochdale Road station, with the view of increasing the supply of gas to the city. The immense gasholders which are noticed above were placed in the Newtown Yard, and a considerable addition was made to the number of retorts in the retort-houses. For some time it was found possible, with these additions, to meet the increasing demand for gas; still the committee, having regard to future wants, cast about for a site for new works, and they recommended the land in Bradford Road as the most eligible for the purpose. The necessity of additional works was admitted on all hands, but the council rejected the proposed site on account of its proximity to Philip's Park, and the apprehension, which was loudly expressed, that the works might cause injury to vegetation, as well as prove a serious nuisance in so thickly populated a neighbourhood. The scheme was in abeyance when, during the severe winter of 1874, we were threatened with a dearth of gas. This circumstance again called attention to the necessity of erecting new works. The Gas Committee re-introduced their scheme. There were long discussions on the subject in the City Council, and much opposition; but finally the committee were victorious, the scheme was adopted, and Wednesday last saw the laying of the foundation stone of the first section of the new station.

The principal entrance to the works will be opposite the main entrance to the City Cemetery. The site of the station embraces 39 acres of land, divided into two nearly equal parts by the Ardwick and Miles Platting loop line, which runs across the land on an embankment. The river Medlock and the Ashton Canal form the southern boundary, the site being enclosed on the other sides by Hulme Hall Lane and Bradford Road. The loop line runs at this point almost due north and south, cutting the site into an eastern and a western section; on the east of the line will be grouped all the works proper, the land on the west being reserved for an extensive range of gasholders. Here there are several acres at present unappropriated, which will give opportunity for further extension if the time should ever arrive when the daily consumption of gas in Manchester exceeds 30 millions of cubic feet per diem. Dealing first with the eastern section of the site, the plan shows that it will be closely occupied by a range of eight retort-houses, four extensive purifying-houses, scrubbers, and ample sheds for revivifying the purifying material. From the main entrance at the corner of Hulme Hall Lane and Bradford Road a long avenue 60 feet wide will divide the retort-houses from the purifying-houses, and the scrubbers and sheds behind them, and afford communication with all parts of the extensive yard. The works are being built in four sections, each of which is to be complete in itself, and capable of producing 5 million cubic feet of gas per day. The first of these sections is now in hand. It will consist of a large block, containing two retort-houses, with a cannel-shed between; and on the south side of the main avenue, immediately opposite the doors of the retort-houses, a spacious purifying-house, with scrubbers and revivifying-shed adjoining. The retort-houses will each

be 362 feet in length and 70 feet wide; the cannel store between them will be 45 feet wide, and will have a huge condenser as long and as broad as the building for roof. A single retort-house will contain 268 through retorts, and, as each house will be a simple reproduction of the other, one section of the works will give no less than 536 retorts, or double that number of mouthpieces. It is, of course, intended to construct the works on the most approved model, and the retort-houses will be arranged to receive hydraulic machinery, if, on further experience of it, the committee should determine to supply it. But the pair of retort-houses are only one part of the single section of the works now in hand. The purifying-house will be 220 feet long by 70 feet wide, and will contain four sets of purifying-tanks. A revivifying-shed of ample dimensions will adjoin the purifying-house, and between the two will be space for six circular scrubbers. Such, it may be expected, will be a single section of the works, and as there are to be four of these sections—each of the same size, and having exactly the same variety and number of houses and sheds—some idea of the magnitude of the undertaking may be formed. A simple sum in multiplication shows that the eight retort-houses will contain 2144 retorts, or 4288 mouthpieces, and that they will be able to produce a daily supply of 20 million cubic feet of gas, or more than three times the present daily production of the Rochdale Road station. When the entire works are complete, the corporation will be able to manufacture daily at their four stations upwards of 30 million cubic feet of gas in the 24 hours. Turning to the western portion of the site, which, as has been already stated, is reserved for some monster gasholders, we find the excavations for four of these already well advanced. At present the intention is to construct eight holders, all on the telescope principle, and of three lifts each. Those which are now in hand will have a diameter of 150 feet, will be 105 feet in depth, and have together a total storeage capacity of 7 million cubic feet. From the canal, which here cuts off the site on the south, will be constructed a basin or dock 240 feet long by 36 feet wide, giving an average depth of water of 6 feet 6 inches. This, with numerous overhead sidings which it is intended to construct from the loop line, will give excellent facilities for obtaining rapid delivery of material, or for the shipment of coke and other products of the works. It has been found necessary, to do away with the possibility of damage arising from floods in the Medlock, to erect a heavy river wall on the north bank of the stream. Before the work was commenced, the course of the river was straightened, and all danger on this head is now removed. The wall, which extends for a distance of 480 yards, is now on the point of completion. It has been a work of some difficulty, the solid rock and heavy measures of fire-clay having to be pierced to get foundations. About 350 men are now employed on the ground, and the whole of the works in hand are being pushed rapidly forward. The works are from designs by Messrs. Mangnall and Littlewood, and Mr. W. Littlewood is the engineer superintending their construction.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

On the whole the iron trade has not grown any stronger during the week, partly owing to the great inanimation which usually characterizes the end of the quarter, and in part by reason of the quietude which has pervaded the Scotch and Cleveland iron markets. From these causes combined, it has come about that local irons have hardly been so steady in tone, and buyers have been encouraged to hold out for better terms before closing their purchases. It is, at all events, quite certain that the regular list prices are by no means to be taken as the exact figures at which actual sales are now being made, for, as a pig iron agent observed to the writer the other day, "nobody knows the price of any particular lot except the buyer and seller." In the open market here, there have been several sales of foundry pig during the past week, but they have been of small parcels only, and have mostly been in respect of Derbyshire pig—such as Denby, Clay Cross, and Sheepbridge. Very little North Lincolnshire pig is being brought into this district at present, but at some of the larger Bessemer establishments very heavy deliveries of hematite pigs are being effected.

In the finished iron branches, too, the week has been duller than some of its predecessors, would-be buyers having withheld their commissions in the hope, which has proved vain, that a reduction at the Staffordshire quarterly meetings would have caused a similar drop here. At some of the works devoted to this branch of the trade, matters are very quiet. At the Northfield Works, the whole of the men and boys employed have been served with a fortnight's notice of termination of contracts, a step which may be regarded as being preliminary to a reduction of wages all round.

In the house coal trade there is now a brisk demand; in fact, the local sale is so good that some of the merchants complain of their inability to obtain from the collieries all the fuel they require. This is a singularly noteworthy fact, and one that completely does away with any intention on the part of the coalowners to attempt any reduction of the miners wages. There is also a fair inquiry for steam coal, both on home and export account, shipments being now nearly completed for the Baltic and other northern ports. Slack is abundant, owing to the increased production of that sort of fuel caused by the better call for large qualities. All kinds of coke are easy, local being 11s. 6d. to 12s. 6d., and Durham (soft) 13s. to 15s. 6d. per ton. The latter is chiefly used for the steel manufacturers.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The only noticeable improvement in the coal trade of this district is in the demand for house-fire classes of fuel, which have been moving off rather more freely during the past week. With regard to other descriptions of coal, however, the market continues extremely dull. There is now little or no inquiry for gas-making coals, and the contract season for this description of fuel may be considered as finally closed. The exceptionally low prices which have been ruling for gas coals have been a temptation to consumers to secure contracts extending over as long a period as possible—in some cases, over two or three years—and these, owing to the keen competition in the market, have in some cases been accepted, whilst colliery proprietors who have declined to contract over more than twelve months have, as a rule, been able to place only a small proportion of their production, and the remainder has now to be pushed upon the market as house coal. Common coal for iron-making and general manufacturing purposes is still affected by the general depression in trade. The demand continues very limited, and, as supplies are abundant, low prices have to be accepted to effect sales. Engine classes of fuel, such as burgy and slack, are also becoming very plentiful and difficult to move, inferior descriptions of slack especially being pushed in the market at extremely low prices. The average quotations at the pit mouth may be given about as under:—Good Arley, 9s. 6d. to 10s.; inferior ditto, 8s. to 8s. 6d.; Pemberton four-feet about 8s., although for good orders less money is taken; common coal, 5s. 6d. to 6s. 6d.; burgy, 5s. to 5s. 6d.; and slack, 3s. to 4s. per ton, according to quality.

The shipping trade is extremely dull, and very low prices are being taken where sellers have to push for orders.

The iron trade still shows no signs of improvement, and, if anything, there has been less animation in the market during the past week. Lancashire brands of pig iron have been moving off less freely, and north country irons are still difficult to dispose of in this district, but there is no material change to notice so far as makers quotations are concerned. Manufactured iron continues in a very depressed condition, and Middlesbrough bars, delivered into this district, are offered at from £6 7s. 6d. to £6 10s. per ton, and Lancashire ditto at £6 10s. to £6 12s. 6d. per ton.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The gas and house coal trades of the Tyne and Wear, as was anticipated, are becoming firmer in tone as we get into October. The shipments of Durham gas and house coals over the last two weeks have been heavy. The week before last 70,000 tons of coals were shipped from the Tyne Dock. There is now a good steady coasting demand, though at the same time it is nothing extra for the time of year; indeed, it is not up to the average of years. An order for 5000 tons of gas coal from Boston, U.S., was placed in the market last week. It was for coals of the best quality, and the price paid was 8s., less 2½. It was thought that as the colliery owners and railway companies in America had taken the alarm, and reduced their rates, the demand for British seaborne coal would cease; but it seems that the strike upon the American railways, and the confusion which followed thereupon, have occasioned short stocks of coals in the eastern cities, and the gas companies are only too glad to get coals from this country at a price represented by 8s. per ton, f.o.b. in the Tyne, and 6s. 9d. to 7s. per ton freight. Of course, the low figure paid for freight arises from the fact that many steamers are leaving this country for the United States to load corn, and rather than go out in ballast they take a low freight for coals. The prices of coals on the Tyne are as follows:—Gas, best, 8s.; medium, 7s. 6d.; inferior, 6s., less 2½. House coals, best Wear, 12s. 6d.; best Tyne, 11s.; seconds, 10s. per ton, less 2½. Steam coals, best, 11s. 6d.; seconds, 10s. to 10s. 6d., less 5—all delivered free on board ship. The steam coal trade is extremely depressed. Collieries are working bad time, and prospects for winter are gloomy.

All kinds of coasting freights are firm. There was an advance last week of 3d. per ton all round. The quotation for steamers is 4s. 6d. to 4s. 9d., London; France, 5s. 9d. to 6s. per ton. Hamburg, £5 15s. to £6 per keel. The business to the lower ports of the Baltic has been better. Mediterranean business is pretty steady. Outward rates for coals to India are improving.

The general manufacturing trade of the North of England is quiet. There is not much demand at present for fire-clay goods of any description, and prices are a trifle lower. The chemical market is depressed. The iron market is dull. Common bars are selling at £6 5s.; merchants bars, £9 per ton. The import trade of the district is very slack. There is a considerable falling off in the house-building trade. Iron shipbuilding is doing very well.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

During the past six months Professor Brazier, Gas Examiner for the City of Aberdeen, has conducted his usual monthly examinations as to the illuminating power and purity of the gas supplied by the Corporation Gas Commissioners of that northern city. The illuminating power of the gas has varied from 31·30 candles to 29·70 candles, and the mean for the six months has been considerably over 30 candles; and the gas has been found to be remarkably free from sulphuretted hydrogen, ammonia, and carbonic acid.

The statutory notices, intimating the intention of the Town Council of Burntisland to adopt the Burghs (Scotland) Gas Supply Act have been issued, and the British Railway Company have intimated their willingness to dispose of the present gas-works, which are their property, for the sum of £10,000.

At the annual meeting of the Whitburn Gas Company, on the 2nd inst., a statement of the income and expenditure for the past year was submitted, which was considered highly satisfactory, and it was unanimously resolved that a dividend of 5 per cent. per annum be declared. The price of gas was fixed to remain at 6s. 8d. per 1000 cubic feet, and the rate to be charged for the street-lamps was fixed at 7s. 6d. each.

At the monthly meeting of the Dundee Gas Commission, on the 3rd inst., it was reported that the average illuminating power of the gas supplied to the town during the month of September was 26·33 standard candles, and that the gas-rental collected during the month was £2667 16s. 9d. The meeting authorized the treasurer to borrow the sum of £10,000 under the Dundee Gas (Additional Powers) Act, 1877.

On Saturday week the Dundee Corporation Gas Commissioners formally opened the new gas-works at Lochee, consisting of a large tank and gasholder, which have been rendered necessary by the attitude of the chief part of Lochee, and by the great consumption of gas in the course of the short period that the factories of the district are lighted up during the 24 hours. The tank is 101½ feet in diameter and 20½ feet deep, and contains the holder, which is 100 feet diameter and 20 feet deep. The whole cost, including the price of the ground, will amount to nearly £6000. At the inaugural ceremony of turning on the gas there was a large attendance of the municipal authorities and other prominent citizens, and some interesting speeches were made in connexion with the event.

On the same day, the twenty-first annual meeting of the shareholders of the Newport Gas Company was held, when it was resolved to declare a dividend to the shareholders at the rate of 7¼ per cent., and to reduce the price of gas from 8s. 4d. to 7s. 1d. per 1000 feet., or 6s. 9d. to those consumers who pay their accounts within 14 days of delivery.

Addressing his constituents the week before last, as a member of the Glasgow Town Council, Bailie Lamberton spoke of the doings of the Corporation Gas Committee, and explained that, owing to the great loss which had been sustained in the escape of gas by leakage from the mains, it had been found necessary to lay down several district governors, so as to regulate the pressure. As a result of one month's working of these governors, he said, a saving of some 7 million cubic feet of gas had been effected. At the meeting of the town council on the 4th inst., several members complained of the deficiency in the pressure of the gas in various parts of the city. It was said that in the East-end some of the public lamps had gone out for want of pressure, and that on the evening of the previous Saturday some parts of the south side of the city were for a time in darkness. Bailie Walls explained what the committee were doing in regard to governors, so as to regulate the pressure and prevent leakage, and hoped that when the alterations were completed there would be no ground for complaint from any district.

At a recent meeting of the Sub-Committee on Works of the Glasgow Corporation Gas Committee, it was remitted to a sub-committee of five members to make the necessary investigations, and to report as to the relative cost of stoking retorts by manual labour and by machinery, with power to visit the Manchester Gas-Works, where machinery is used, and also the London gas-works, if they consider it necessary to do so. At a meeting on the 19th ult., a statement was submitted to the sub-committee by Mr. Davidson, manager of the Dawsholm works, as to the relative cost

of the two systems of stoking the retorts. Having gone over the statement, the sub-committee adjourned for the further consideration of it, and remitted to Messrs. Smith and Dron (both professional engineers) to see whether or not the repairs required on the stoking machines used by Mr. Davidson could be executed, in the future, at a cheaper rate than has hitherto been charged.

At the meeting of the Town Council of Airdrie, held on the 4th inst., it was resolved that the matter of testing the illuminating power of the gas supplied to the town should be remitted back to the Fire and Lighting Committee.

The town of Alloa has now completed not only the adoption of the Burghs (Scotland) Gas Supply Act, 1876, but also the actual purchase of the whole undertaking of the local gas company. As I mentioned some time ago, Mr. Foulis, engineer and general manager to the Glasgow Corporation Gas Commissioners, was chosen as the arbiter on the part of the Alloa Burgh Commissioners; and Mr. Fairlie Wilson, consulting gas engineer, London, acted on behalf of the gas company. The price mutually agreed upon by those two gentlemen for the works, &c., was £23,250, as from the 29th of June last, together with 5 per cent. on the purchase price from that date until payment is made. I understand that the official award of the arbiters had not been made to the gas company up till Friday morning, but a private meeting between the Burgh Commissioners and a committee of the gas company was held on Friday night, at which the matter was finally settled. The capital of the company is £10,000, in 1000 shares of £10 each, all of which are fully paid up. In virtue of the act just referred to as completed, Alloa has outstripped Dumfries, and all the other towns in Scotland that have signified their intention to adopt Sir Windham Anstruther's Gas Act.

At a special meeting of the Police Commissioners of Lockerbie, held on Monday, the 8th of October, it was unanimously resolved to adopt the Burghs (Scotland) Gas Supply Act in the burgh, and the meeting appointed Wednesday, the 5th of March, 1878, for resuming consideration of the resolution in terms of the Act.

One of the items of business at the meeting of the Dumfries Town Council, held on the 8th inst., was the consideration of a letter from Mr. John Symons, law agent to the Dumfries Gas Company, stating that the company had passed a resolution to sell their property to the town council, by arbitration, for cash, under the provisions of the Gas Act. It was remitted to the Gas Committee of the council to enter into the arbitration, and sign the contract.

At a meeting of the Dumbarton Corporation Gas Commissioners, held last Wednesday, the Provost referred to the success that had attended their efforts in the making of gas, pointing out that since the commencement they had made a profit of £1726, which was a very satisfactory state of matters. The committee had no difficulty in coming to the conclusion to recommend a reduction in the price of gas to 4s. 7d. per 1000 cubic feet—the price charged before the great advance in coal—and he moved the adoption of that recommendation. In two years they had been able to reduce the charge from 6s. to 4s. 7d., and he was warranted in saying this was the smallest sum charged for gas in any town in Scotland similarly situated. In seconding the motion, Bailie Kennedy supplemented the Provost's remarks by saying that the works were in excellent condition for the manufacture of gas. Were the town to become as busy as they had seen it, and as they hoped to see it again, they would be able to meet the demand for gas, and to realize even a greater profit. The recommendation was agreed to. The motion given above does not include the fact that it has also been resolved by the same body to reduce the price of gas for the public lamps to 4s. 2d. per 1000 cubic feet.

At the ordinary meeting of the Town Council of Edinburgh, held last Tuesday, Mr. J. Falconer King's usual report on gas analysis was submitted, which showed that the Edinburgh Company's gas had an illuminating power of 26·40, and the Leith Company's of 26 candles. Mr. Macdougald remarked that this was the lowest quality yet reported, and suggested that the matter should be looked into, while Mr. M'Lauchlan thought they should ascertain what sort of gas was supplied in many English towns at the low rate of 2s. 6d. per 1000 feet. It was agreed to remit the subject to the Cleaning and Lighting Committee for inquiry and report, Mr. Macdougald being added to the committee for the purpose.

Dr. Wallace's report on the Glasgow gas, for the week ending Oct. 6, shows that in one instance, at least, the minimum illuminating power was as low as 25 candles.

The Glasgow pig iron market has been extremely depressed during the past week. Prices have declined daily, though a large business has been done. The price is now lower than it has been since 1870. Business was done on Friday afternoon at 53s. 1d. to 53s. 2d. cash.

There is no improvement to report in the coal market. It is very difficult to book orders.

Bradley Green Gas Company.—At a meeting of the directors of this company, held at their offices on Friday last, the gas-works were again leased to Mr. G. S. Furnivall, who has already held them on lease for the last seven years.

Destruction of a Gasholder at Eastbourne.—We learn from a correspondent that the new holder at the Eastbourne Gas-Works collapsed on Friday last, but we have not yet been furnished with details of the unfortunate catastrophe.

Fire at the Neepsend (Sheffield) Gas-Works.—On Friday evening last, a large stack of coke at these works was discovered to be on fire. The fire-engines of the company were found to be ineffectual in quenching the burning mass, and the assistance of the fire brigade of the town had to be called in for the purpose.

Salford Corporation Gas-Works.—The Gas Committee of the Corporation have not yet made their annual report to the council, but we understand that when it is presented it will show a profit upon the past year exceeding that of any previous year since the existence of the committee, which augurs well for the newly-appointed engineer and manager, Mr. S. Hunter.—*Salford Chronicle.*

The Proposed Purchase of the Bristol Water-Works.—A meeting of the inhabitants of Bristol was held at the Athenæum, on Friday last, to protest against the proposed purchase of the water-works by the council. The chairman (Mr. H. J. Brown) took the opportunity of denouncing the purchase as unjust and injudicious, and moved the following resolution:—"That this meeting, having learned that it is the intention of some of the municipal representatives to proceed with the proposed purchase of the water-works, thus ignoring the ratepayers in their decision to do so, hereby protest against such intention, and request the council not to proceed with the proposed purchase."

Embezzlement at the Neath Corporation Gas-Works.—Our Neath correspondent writes: "Public rumour has for some days past been busy with the disappearance of an official connected with the corporation gas-works. A meeting of the Gas Committee was held at the Guildhall, on Thursday, when the manager presented his books, he having discovered that one of his subordinates had absconded with certain moneys, and that he was, therefore, a large defaulter to the corporation. The proceedings of the meeting were not made public. Other charges of a serious nature are also made, but pending an official inquiry it would be premature to refer to them. It will be recollected that one official connected with the gas-works is at this moment undergoing a term of six months imprisonment for having robbed his employers."—*South Wales Daily News.*

Construction of a Gasholder-Tank at Middlesbrough.—At a special meeting of the Middlesbrough Town Council, on the 12th inst.—the Mayor (Alderman Wilson) presiding—the tenders for the contruction of a new gasholder-tank were taken into consideration. Mr. Dunning reported that the following tenders had been received:—

	For a Tank on Mr. Livesey's Plan.	Mr. Cail's Plan.
Pearson Brothers	£9,550	£11,928
Brumley, H.	—	11,350
Johnson, J., and Sons	6,945	—
Inglis, F. (amended)	6,578	6,530
Docwra and Son	8,255	—
Wilkinson and Pounder	7,900	9,100
Johnson, Jno.	8,900	—

The tender of Messrs. J. Johnson and Sons was accepted.

Fylde Water-Works Company.—The half-yearly meeting of shareholders was held at Kirkham on the 11th inst.—Mr. F. Kemp presiding. The report of the directors was to the effect that the last statement submitted to the stockholders showed the expenditure on capital account to be £149,527; the payments on this account amounted to £17,311 during the six months ended August last; making a total to that date of £166,838. The revenue account for the same period showed the amount received for water, &c. (including a balance of £80 from last account), to be £6621, less interest on loans, commission, and working expenses (£2184); leaving a balance of £4437. The receipts from water exceeded by £533 those for the corresponding half of last year. The number of houses supplied had increased during the half year from 5726 to 6111. Upwards of £4000 had been expended on the Grizedale reservoir repair and water supply extra. The mode of providing for this the directors proposed to reserve for the present; and with this large unclosed account did not recommend the division of the whole of the net revenue, but proposed a dividend at the rate of six per cent. per annum, free of income-tax, and to carry over the residue, £659 9s. 11d., to the reserve-fund, thus making it £4159 9s. 11d.

Hull Gas Supply.—According to the report of Mr. James Baynes, the gas sent into the district of Sculcoates and Myton, during September, by the British Gas Company averaged a little over 16 candles illuminating power. At no time was sulphuretted hydrogen or free ammonia present to the ordinary tests:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·62	15·69	16·10
Grains of sulphur per 100 cubic feet	28·50	24·50	26·90

Mean barometer and temperature: bar., 30·20; temp., 62°. The gas supplied by the Sutton, Southcoates, and Drypool Gas Company, during the month of September, Mr. James Baynes, jun., reports, gave the following results:—

	Max.	Min.	Mean.
Illuminating power standard sperm candles	16·35	14·36	15·30
Grains of sulphur per 100 cubic feet	—	—	7·41
Grains of ammonia per 100 cubic feet	—	—	15·70

Mean barometer and temperature in experiment-room: bar., 30·03; temp., 59·5°.

Odessa Water-Works Company, Limited.—The report of the directors for the past half year states that the water-rents show a receipt of £16,149, against £18,703 in the corresponding half year of 1876. The expenditure at Odessa and in London amounted to £13,474, which compares with £12,913 in the first half of 1876. This unsatisfactory state of affairs is referred to with regret, and is, of course, mainly due to the present war, which has, it appears, added very much to the many difficulties with which the undertaking is overwhelmed, it being computed that as many as 25,000 persons have left Odessa, amongst them being many of the company's best customers. Coal, it is mentioned, can only be obtained from Silesia at double the usual cost, and, as a climax, all claims and requirements of the company in connexion with the flushing of the drains, and other sanitary arrangements, which were under consideration at the outbreak of the war, have been postponed *sine die*. In conclusion, the report states that, "Whether the restoration of peace, with other blessings, will include a recognition of the immense benefits the company have conferred upon Odessa, as well as the importance to Russian credit that payment for the same should not be ignored as it hitherto has been, remains to be seen."

Sales of Provincial Gas and Water Companies Shares.—On the 4th inst. 106 fully paid-up £10 shares in the York Gas Company were offered for sale by auction, and realized prices from £11 19s. to £12 2s. per share. On the same day a number of £5 shares in the Chatham and Rochester Water-Works Company were sold, and realized £8 13s. each. The *Wakefield Express* of Saturday last contains the following:—"Some time ago the Wakefield Gas Company applied to Parliament for a new Act, giving them increased powers, and were successful in their application. In accordance with the provisions of the new Act all new capital created by the company has to be offered for sale by auction in some public place; and the first of these sales took place in the hall of the Church Institution on Thursday afternoon, when 2500 new shares of £10 each were offered in 50 lots of 50 each. There was a large and influential attendance of shareholders and capitalists, the company including several of the principal residents in the town and some from the surrounding district. The auctioneer (Mr. G. Beaumont) opened the proceedings with a brief explanation as to the reason why the shares were offered for sale, and then called upon Mr. J. Whitaker, the company's secretary, to read the conditions of sale, which were very brief. The premium is to be paid at once, £2 per share on or before the 1st of next month, and the balance when called up by the directors. The bidding, particularly for the first 20 and the last seven or eight lots, was very spirited, and the shares realized far higher prices than had been anticipated. The highest premium realized per share was £2 17s., and the lowest £2, the average being £2 6s. 7d. The whole realized between £5000 and £6000."

The Electric Light.—The *Birmingham Daily Post* contains the following paragraph, which is an amplification of a notice in a recent number of *The Engineer* on the "Electric Light in Workshops":—"Large consumers of light who have occasion to complain of their gas bills, and believe that the evil lies deeper than the registering apparatus of their meters, may be interested to learn that gas is not indispensable to the brilliant and economical illumination of their factories and workshops. For general illuminating purposes, especially in small areas, coal gas undoubtedly offers great advantages in the facility with which it may be applied, and the safety and steadiness of the light it affords, but where large areas are in question, and perfect and unbroken uniformity of light is not indispensable, gas is far surpassed, not only in brilliancy but in economy, by the electric lamp. This invention, which has long since taken root in America, is rapidly making its way on the Continent, and especially in France, where the manufacture of electric lighting apparatus is already an

important industry. One serious objection which was formerly urged against the use of this concentrated light—namely, the density of the shadows cast on the reverse of the illuminated objects—has been successfully met, we are told, by the employment of two lights in juxtaposition, so as to neutralize one another's shadows, and by the introduction, where needed, of diffusing glass, &c. The apparatus is now rapidly growing in favour both for indoor and outdoor purposes; and in most of the larger workshops, factories, foundry yards, quays, dockyards, &c., of France it appears to have certainly superseded gas. On the score of economy, the advantages of the electric light are certainly considerable, though the first cost of the apparatus will always prevent its adoption for small buildings, to which it is in some respects unsuited. In France the expense of the apparatus, including lamp, magneto-electric machine, wires, &c., is about £96; but, once erected, the cost of maintenance, including the combustible carbon points and all incidentals, does not exceed, on the average, 6d. per hour. Such, at least, is the experience in the Gramme Company's workshops, where these lamps have been in constant use for the last four years. Their principal workshop, which is 16 feet in height, and 1468 square feet in superficial area, was formerly lit by 24 gas-burners, but a single electric lamp now suffices to give a vastly better light, and at a much smaller cost. At the Du Commun Works, at Mulhouse, the foundry, which has an area of nearly 16,000 square feet, was formerly lit in a very imperfect manner by 250 gas-burners. Perfect illumination is now supplied by four electric lamps attached to cross beams, at a height of 16 feet from the floor, and worked by a single Gramme machine. The first cost of the apparatus here was £400, or about the same as that of the 250 gas-burners which it replaced, and the light afforded by the four lamps is fully equal to that of 400 burners. As a general rule, we are told one lamp will illuminate sufficiently an area of 5120 square feet in a machine shop, half that area in a printing or weaving establishment, and four times that area on a quay, shipyard, or other locality where fine work is not carried on. The use of the light, however, is still attended with one disadvantage. Each lamp burns ordinarily from three and a half to four hours, when new carbons must be inserted. The operation requires only a few seconds; but it, nevertheless, involves a break in the lighting of the room, and a consequent interruption of work, unless a second lamp be in use. The electric light, it will be seen, is better adapted for the illumination of iron-works, railway-stations, dockyards, mines, and large concert-rooms like the Birmingham Town-Hall, than for average factories or private premises; but there should, nevertheless, be abundant scope for its employment in Birmingham and the Midlands, and we see no reason why some of our lamp manufacturers should not turn their attention to the production of the apparatus."

PURCHASE OF THE LEICESTER WATER-WORKS.—An adjourned meeting of the Leicester Town Council, to consider the water-works purchase question, was held on the 9th inst., when the following heads of agreement, which had been laid before a previous meeting, were almost unanimously agreed to:—

1. The corporation to purchase and take over the undertaking of the company.
2. The consideration for such purchase to be—7 per cent. per annum upon the share capital of the company. The shares to be converted into 4 per cent. stock, at the rate of £43 15s. for each £25 share. The corporation to have the option of redeeming such stock at par at any time on giving six months notice.
3. The stock and interest thereon to be charged upon the water undertaking of the corporation, and upon the borough rates, or in such other way as may be agreed upon.
4. The undertaking to be taken over on the 1st day of September, as from the 1st day of July, 1878, in case the Act hereinafter mentioned shall not then have been obtained this 1st day of September as from the 1st day of July, 1879, from which days respectively, as the case may be, the stock is to be issued; but the interest thereon shall commence from July 1, 1878, or July 1, 1879, as the case may be, and shall be payable half-yearly on the 1st of January and the 1st of July in each year, the first payment being due on Jan. 1, 1879, or Jan. 1, 1880, as the case may be.
5. Until the actual transfer to and taking over by the corporation, the company to carry on their business, and to make all payments as fully as hitherto, and to make such extensions as may be necessary, and to act in the management of their business for the benefit of the undertaking as if no agreement had been entered into, but they were carrying it on for the benefit of their shareholders.
6. The company to retain out of their general assets the amount of all unclaimed dividends for which warrants shall have been issued, and also to retain and distribute amongst the shareholders the half-yearly dividends on their shares, in respect to the half year ending on June 30, 1878, or on June 30, 1879, as the case may be.
7. The corporation and the company to apply for a joint Act of Parliament in the next session to carry out the arrangements, and in the event of such Act not being passed in the next session, or, failing that, in the next following session this agreement, unless otherwise mutually agreed upon, to be void. The joint Bill to be settled, in case of disagreement on any point, by counsel to be selected by the Board of Trade.
8. The company not to issue any further share capital until the result of the application for the joint Bill is ascertained. If more money shall be required by the company, pending this arrangement, the company may borrow the same from their bankers, or other persons, on the best marketable terms, in lieu of issuing shares, and all such loans shall be taken to by the corporation as part of the obligations of the company.
9. The officers, clerks, and servants of the company, whom the corporation may decide to retain in their service, to be considered with respect to any superannuation-fund, or other benefits, as having been in the employ of the corporation during the whole time—*i.e.*, their service with the company and the corporation to count as continuous.
10. The corporation to take upon themselves and discharge all the debts, liabilities, and obligations of the company existing at the time of taking over, and hold the company harmless therefrom, and to issue on such taking over, to each shareholder, certificates of the stock in respect of the shares held by him, in a form to be provided in the joint Act.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

3706.—ANNELL, O., Stockholm, "Improvements in gas governors or regulators." Oct. 5, 1877.
3724.—ALEXANDER, E. P., Southampton Buildings, London, "Improvements in water-filters." A communication. Oct. 8, 1877.
3729.—NAWROCKI, G. W. VON, Berlin, "Improvements in apparatus for regulating the temperature and pressure of steam or other fluid employed in treating processes, and the duration of its application." A communication. Oct. 8, 1877.
3748.—PINNINGTON, G., Chester, "Improvements in pumps." Oct. 9, 1877.
3767.—CRYER, J. W., and BUTTON, G., Kingston-upon-Hull, "Improvements in reflecting surfaces for increasing the illuminating or lighting power of gas and other lights." Oct. 11, 1877.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

1313.—JUSTICE, P. M., Southampton Buildings, London, "Improvements in exhaust nozzles for discharging steam and gases under pressure." A communication. April 4, 1877.
1334.—CARR, A., Paterson, and ARTHUR, J., Jersey, U.S.A., "Improvements in pumping-engines." April 5, 1877.
1342.—VICARS, T., the elder, VICARS, T., the younger, and SMITH, J., Liverpool, "Improvements in so-called 'mechanical stokers.'" April 6, 1877.
1503.—MORGAN-BROWN, W., Southampton Buildings, London, "Improvements in duplex pumping-engines." A communication. April 18, 1877.
1592.—NEWTON, J., Stoke-upon-Trent, "Improvements in apparatus for regulating the supply of gas to gas-burners for street-lamps and other purposes." April 24, 1877.

PATENTS WHICH HAVE BECOME VOID
BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

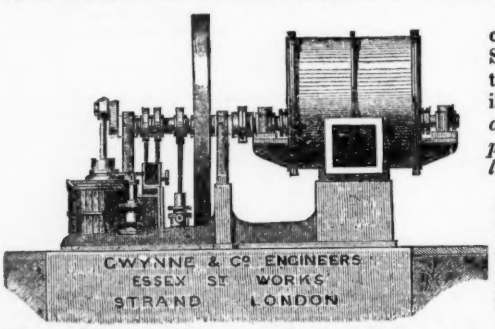
3240.—MALAM, W., and GRAVES, T., "Improvements in apparatus for mixing air with the vapour of liquid hydrocarbons to be used for lighting and heating or for any other purpose; also in the treatment of such hydrocarbons with a view to purifying the same and obtaining a useful product therefrom." Sept. 22, 1874.
3269.—SPICE, R. P., "Improvements in apparatus used in the manufacture of gas." Sept. 24, 1874.
3281.—DAY, ST. J. V., "Improvements in the manufacture of gas, and in the means or apparatus employed therefor." Sept. 25, 1874.
3287.—FURNESS, G., "Improvements in the construction of cocks and valves for controlling the flow of liquids and fluids." Sept. 25, 1874.
3319.—BESSEMER, H., "Improvements in apparatus for collecting and storing water for the supply of towns, villages, dwelling-houses, factories, and chemical or other works, and for agricultural purposes." Sept. 28, 1874.
3346.—ROBINSON, F., "An improved mode of and apparatus for the manufacture of gas." Sept. 30, 1874.
3352.—LYNDE, J. H., "An improved apparatus for saving water in water-closets, urinals, and other places where a fixed quantity of water is required at each operation." Oct. 1, 1874.
3404.—TROTTER, H., "An improved self-lighting and extinguishing apparatus." Oct. 6, 1874.

PATENTS WHICH HAVE BECOME VOID
BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £100 BEFORE THE EXPIRATION OF THE SEVENTH YEAR.

2117.—SOUTHBY, A. G., "Improvements in apparatus for cooking by gas." July 28, 1870.
2229.—PENN, T., "An improved method of regulating the opening and closing of water-closet and other cocks by hydraulic pressure." Aug. 11, 1870.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS;
Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

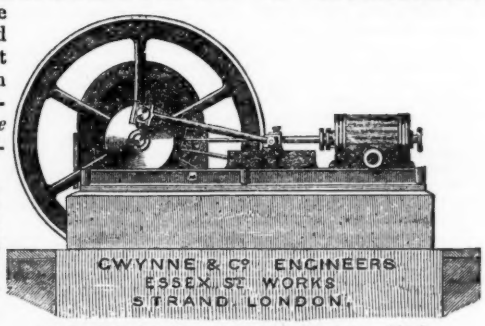
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure.
Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers,
ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

☞ *G. & Co. are now making 6 Sets Exhausters and Engines for 105,000 cubic feet per hour, 3 Sets 180,000 Exhausters and Engines, with many others of all Sizes.*

WANTED, a good Gas-Fitter and Main LAYER. Constant employment if suitable.
Address LUDLOW UNION GAS Company, Ludlow, SALOP.

WANTED immediately, a steady single Man as STOKER.
Apply, stating age, wages, and references, to Mr. THOS. THIMBLEBY, Gas Office, SPILSBY.

WANTED, at a Gas-Works near Cardiff, a GAS-FITTER. Must be well experienced in main and service laying and taking meter indices.
Address, stating experience, to No. 405, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a steady young Man, just disengaged, a situation as GAS-FITTER, to fix meters, read indices, lay services, &c. Well up in all the branches of internal fitting.
Address C. N., 4, Market Street, Guildford, SURREY.

WANTED, the Management of a small Gas-Works, or as a GAS-FITTER. Main and service laying. Fourteen years character.
Address No. 404, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an experienced Main Layer and FITTER. One used to retort-house work. Constant employment if suitable.
Apply, by letter only, to No. 398, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a practical Man, a situa- tion as MANAGER of Gas-Works, where the annual make is from 15,000,000 upwards. Good testimonials from last situation.
Address No. 407, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as Working MANAGER or leading STOKER. Used to engines and exhausters. Twelve years experience. Good references.
Address J. PLUMMER, 7, Percy Road, Carlton Road, Kilburn, LONDON.

WANTED, by a well-known firm of Gas Engineers and Contractors, a TRAVELLER of good address, with a knowledge of gas apparatus and gas manufacture. A good salary will be given.
Applications and testimonials to be sent to No. 401, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, the Address of Gas Com- panies who have not received a Copy of the New Edition of PAMPHLET for GAS COMPANIES to distribute to their Gas Consumers—"Cooking and Heating by Gas." Price £6 for first thousand. Copies by post Threepence—direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

WANTED, by a Young Man who has served his apprenticeship to a Gas Engineer, a situation as MANAGER of a small Gas-Works, or to act as Assistant to the Engineer of a large Works; has had good practical experience, and can be strongly recommended.
Address No. 382, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Exeter Gaslight and Coke Company, an experienced WORKING FOREMAN, who has been accustomed to the routine of a Gas-Works. Wages £2 2s. per week.
Applications, stating age, experience, and where now engaged, with references, to be sent to the SECRETARY, Gas Offices, EXETER, on or before the 20th day of October inst.

CARBONIZING FOREMAN.

WANTED, by a Gas Company in the Provinces, an energetic and practical working Man as Carbonizing FOREMAN, who thoroughly understands furnaces and retort-house duties. Must have held a similar situation. Present annual make 200 millions.
Apply by letter only, in first instance, with full particulars, to No. 402, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.
John Leigh, Esq., M.R.C.S., F.C.S, &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

A Sober, competent Gas-Fitter and SERVICE LAYER can have constant employment. State wages required, and forward certificates as to character, &c.
Address No. 408, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Advertiser is desirous of meeting with an appointment as MANAGER or ASSISTANT MANAGER of a Gas-Work (having managed successfully a Gas-Work where the make was close upon 100 millions per year), or a situation in a Gas Apparatus Manufactory. No objection to go abroad.
Address J. H. LYON, 24, Park Street, MACCLESFIELD.

THE Government of South Australia are desirous of securing the services of an ENGINEER, to proceed to, and reside in, the City of Adelaide, who would be fully qualified to take charge of the existing gravitation Water-Works that have been in use to supply the City of Adelaide, Port Adelaide, and other adjoining districts, during the last 20 years, on the constant system, at high pressure; and to design and carry out such extensions as from time to time may become necessary in connexion with the present Works; and to design and carry out New Works for the supply of Water to districts adjacent to Adelaide, or to such as the Government may require to be supplied in other parts of South Australia.

It is considered desirable that the person appointed should have been educated in the workshops and drawing office of a Mechanical Engineer; should possess a good practical knowledge of mechanical engineering, of surveying and levelling; and should be grounded in the principles of geology and chemistry; and should be from 28 to 38 years of age, or thereabouts. That he should subsequently have had experience in the construction of Works in brick, masonry, and earthwork; the construction of both impounding and covered service reservoirs; the laying and jointing of cast-iron mains and pipes, and the fixing of screw-cocks, hydrants, &c., in connexion with the same.

That he should be capable of selecting suitable sites, where any such exist, for the construction of wells, boreholes, and other subterranean works, that would yield a supply of water fitted for domestic uses, and be able to design and superintend the carrying out of the necessary works to procure and convey water to the intended consumers from such selected subterranean, as well as from other more obvious, sources.

That he should be able to advise the Government with regard to works for irrigation and other kindred subjects.

The salary that the South Australian Government would be prepared to pay to the gentleman appointed would be at the rate of £900 per annum.

Application, to be made in writing, should be addressed to Sir ARTHUR BLYTH, K.C.M.G., the Agent-General for South Australia, and be delivered on or before the 28th of October next, at his Office, 8, Victoria Chambers, WESTMINSTER, accompanied by short particulars, stating where the candidate has been educated, and how he has been occupied from year to year since his 18th birthday to the present time.

No personal application can be entertained.

TO GAS ENGINEERS, GAS APPARATUS MANUFACTURERS, CONTRACTORS, &c.

A Gas Engineer, aged 30, who has been engaged as Assistant Engineer in the erection of Gas-Works in five large towns during the last ten years, is open to an engagement. Is a good draughtsman, a competent analyst, and is well acquainted with the manufacture of ammoniacal salts. An engagement which might lead to a future partnership preferred.
Address No. 406, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TENDERS FOR TAR.

THE Directors of the Lewes Gaslight Company invite TENDERS for their surplus TAR of the 1st of September next—about 30,000 gallons. Contractor to find all casks, and pay all rail charges. Accounts and cash monthly.
Tenders to be addressed to the undersigned not later than Saturday, the 20th of October inst.
JOHN HAMMOND, General Manager.
Lewes Gas Company, Lewes, Sussex.

ROCHDALE CORPORATION.

THE Gas Committee of the Rochdale Corporation invite TENDERS for the supply of Cast-Iron PIPES, delivered at the Rochdale Railway Station, as follows, viz:—

500 yards.	6 inch.
500 ,, ...	5 ,,
1000 ,, ...	4 ,,
1000 ,, ...	3 ,,

A price is also required for IRREGULAR CONNEXIONS. All except connexions to be turned and bored, and coated with Dr. Smith's patent process.
Particulars as to weights, and any other information required, may be obtained from Mr. Paterson, Engineer, Gas-Works.
Tenders, endorsed "Gas-Mains," to be sent to me on or before Oct. 23, 1877.
By order,
ZACH. MELLOR, Town-Clerk.
Town-Hall, Rochdale, Oct. 11, 1877.

THE Salford Corporation Gas Committee invite TENDERS for the supply of GRIDS and VALVES, and DESIGNS and TENDERS for the supply and erection of Four EXHAUSTERS of the nominal power of 60,000 cubic feet per hour, together with engines, valves, and fittings.
Further particulars may be obtained from the undersigned, to whom all tenders must be sent, on or before the 26th inst.
The Committee do not bind themselves to accept the lowest or any tender.
By order,
SAMUEL HUNTER, Engineer.
Lamb Lane Gas-Works, Salford,
Oct. 13, 1877.

TO CHEMICAL MANUFACTURERS, TAR DISTILLERS, AND OTHERS.
TENDERS FOR TAR AND LIQUOR.

THE Directors of the Gravesend and Milton Gaslight Company are prepared to receive TENDERS for the purchase of their surplus TAR and AMMONIACAL LIQUOR for One year, from the 13th of November next.
The quantity of Tar will be about 40,000 gallons, and that of Liquor about 65,000 gallons in the year.
The Company will load into the contractor's barges.
The average strength of the Liquor is about 11 ounces, but the Company will not guarantee that or any other strength.
Any further particulars can be obtained on application at the works, at Gravesend.
Tenders, marked "Tender for Tar, &c.," to be sent to my Office, 27, King Street, Gravesend, on or before Tuesday, the 30th of October next.
The Company do not bind themselves to accept the highest or any tender.
TUFNELL SOUTHGATE, Secretary.
Gravesend.

Now ready, price One Shilling, No. 11 *(to be continued Monthly) of*

A TREATISE ON THE SCIENCE & PRACTICE
OF THE
Manufacture and Distribution
OF
COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET,
OR OF ANY BOOKSELLER IN TOWN OR COUNTRY.

For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed, at the cost of 1s. 2d. Monthly, or 7s. for the Half Year.

Now ready, price 7s., by Post 7s. 3d.,
A SECOND EDITION (feap. 8vo., morocco gilt)
OF
THE GAS MANAGER'S HANDBOOK.
BY THOMAS NEWBIGGING, A.I.C.E.
CONSISTING OF
Tables, Rules, and Useful Information for Gas Engineers, Managers,
And others engaged in the Manufacture and Distribution of
COAL GAS.
WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Now ready, price 5s., by post 5s. 3d., cloth, 8vo., gilt lettered,
SULPHUR COMPOUNDS IN GAS.
A full Report of the Evidence given before the Select Committee of the House of Commons on the Bills of The Gaslight and Coke Company and the Crystal Palace District Gas Company in the present Session.
LONDON:
WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, E.C.

NOTICE OF REMOVAL.
D. BRUCE PEEBLES & CO.
Beg to announce that they have REMOVED to their New Premises,
TAY WORKS, BONNINGTON, EDINBURGH,
To which all communications should now be addressed.
May 30, 1877.

TO PURCHASERS OF GAS-METERS.

Oct. 16, 1877.

GENTLEMEN,—Again, at the commencement of another season, we address you upon the important subject of Gas-Meters.

The agitation of the question by the public is indicative of the distrust, more or less general, of the accuracy of measurement and registration of Gas-Meters. This distrust, it must be admitted, is well founded; it has arisen from two causes—first, the great variation to which the high-spouted Wet Meter was liable; and, secondly, the vagaries of the dry. It is, however, the latter cause which has most contributed to engender the dissatisfaction now prevailing. How great is this cause—how great the discrepancies in measurement—is well known to careful and observant engineers and managers; but beyond this private personal experience are the discussions that have taken place upon the subject from time to time at the meetings of the British Association of Gas Managers, and also the elaborate chart prepared for the lecture delivered by Mr. Warner, at Newcastle, at the beginning of this year. "Is it not," as Mr. Warner asks, "a gross injustice to the consumers to allow such a state of things to continue? Meters registering 10 per cent. fast, and others—not a few—10, 20, and 30 per cent. slow and upwards."

There is but one remedy for this—that suggested by the JOURNAL OF GAS LIGHTING—a Royal Commission. It is this alone that will assure the public that gas can be measured with as great accuracy as any other fluid, and that the registration may almost be said to be infallible.

In the consideration of the relative merits of Wet Meters (assuming—though we manufacture this as largely as any other house—that the general use of the Dry Meter be prohibited), the common or ordinary Wet Meter must be excluded—first, from the shortness of range of the float; and, secondly, because the full extent of the 5 per cent. margin must be taken advantage of. The comparison is thus fairly reduced to two classes—the ordinary wheel, supplemented by means for maintaining a constant water-level, upon which accuracy of measurement is dependent, and the Warner and Cowan Drum, which is an unvarying measure, irrespective of water-line.

The best and simplest of the former class is admitted to be that manufactured by us, under the patent of the late Mr. Esson, but that has now almost given place to the Warner and Cowan. Our largest consumers use the latter only; indeed, there are but three or four of our customers who order the former. This, then, being our experience, it may be said that comparison ceases. The soundness of our judgment in bringing out this Meter in competition with the best known Compensating Meter is confirmed, the soundness of the theory upon which the Meter was constructed being backed by the experience of ourselves and customers for the last three years. The more complex and less satisfactory mode of maintaining a uniform water-line by mechanism, for

raising the water by mechanical means, need not be referred to beyond drawing attention to the fact that an attempt is again being made to revive this class of Meter.

The great advantage of the Warner and Cowan Drum over every instrument of this kind of Compensating Meter will be at once seen by considering that water has to be raised in the one case to an uniform level, and that the measures of the other adapt themselves to the water-line; one is an unvarying measure, the other is dependent on secondary means. The compensation does cease in the one through failure of the compensatory mechanism; the other is a perfect measure within itself, and can never fail.

The registration of Meters, under varying speeds, is a matter for consideration. One of the causes that led to the condemnation of one of the best of Dry Meters was increasing the speeds by decreasing the sizes of the Meters. This is virtually here attempted. If the present standard sizes are too large, by all means reduce them and the prices too. Let the 2-light be defined as a 3 light, and charged accordingly, and so with the other sizes, and then again reduce them, for it is the pressure that determines the quantity of gas that may be made to pass through a Meter. *A minimum of pressure, however, which is most desirable for consumers and companies, is not compatible with the maximum of speed*, hence the fallacy of the theory.

The Meter should pass, under ordinary pressures, a quantity in excess of the normal volume for which it is made, and that correctly. The Warner and Cowan does this under every change of water-line. Again, in this respect, the advantage of the most simply constructed instrument is obvious; the more simple the Meter (and in the Warner and Cowan there is but a cylinder on a shaft working in two bearings), the less the wear and tear, the greater the durability, the greater the staying qualities, if we may so put it. The trueness and soundness of any principle in its application can always be tested by the directness and simplicity of its action, and as the Warner and Cowan invention is the only one which goes directly to the root of the evil—viz., to the measuring chambers, and renders them independent of the water-line, by causing the drum to *regulate itself*, and as, in doing this, it has not added one single extra moving part to the Common Meter, it is, therefore, the Meter which is truest in principle. We had almost said the only Meter true in principle, and, in fact, with the exception of the Common Meter, it is so, because "Compensating" Meters, one and all of them, *endeavour* to obtain correct measurement by indirect means. This Meter *is* made "as accurate a measure as a quart pot." The opinion of W. Richards, Esq., of London, the inventor of the Dry Gas-Meter, is as under: "Your improvement in the Wet Meter is decidedly the best that has been introduced since its invention; exceedingly beautiful and simple, which renders the instrument mathematically correct, *and infinitely more accurate than any means in general usage for the measurement of liquids*."

Gentlemen,

Yours respectfully,

W. & B. COWAN.

London, Manchester, and Edinburgh.

FOR SALE—One Exhauster by Jones, of Birmingham, capacity 25,000 feet per hour, with bye-pass, 12-in. inlet and outlet pipes and valves complete, in first-class working condition, price £40; also one Exhauster Regulator, with chain and weights complete, price £5.

Apply to CLAPHAM BROS., Ironfounders, &c., Keighley, YORKS.

GASHOLDER FOR SALE.

ONE Telescopic Gasholder, 70 feet by 20 feet, complete, with cast-iron tank, columns, girders, and inlet and outlet pipes, valves, &c., of modern construction. In first-class condition, and made by Messrs. Piggott and Co., of Birmingham.

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Cause of removal to make room for extensions.

To be sold a bargain, taken down, and re-erected ready for work.

For particulars, apply to Messrs. ASHMORE AND WHILE, STOCKTON-ON-TEES, or to view to Mr. CALLOW, Gas Engineer, BIRKENHEAD.

GAS PLANT FOR SALE, suitable for Small Works:—

Seventeen 4-inch and 3-inch H-Pipes.
Eighteen 15-inch Circular Mouthpieces.
A 6-inch Governor.
A Station-Meter, to pass 6000 cubic feet per hour.
Scrubber and Washer combined; very good.
Vertical Condenser; very good.
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Two Gasholders, each capable of holding 15,000 cubic feet.

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THE LAW RELATING TO GAS AND WATER: comprising the Rights and Duties, as well of Local Authorities as of Private Companies, in regard thereto, and including all Legislation to the close of the last Session of Parliament. Second Edition. By W. H. MICHAEL and J. SHIRESS WILL, of the Middle Temple, Esqs., Barristers-at-Law.

London: BUTTERWORTHS, 7, FLEET STREET, Her Majesty's Law Publishers.

NOTICE.

MESSRS. THOMAS DOCWRA & SON, Contractors, Balls Pond Road, hereby give notice that they have no business connexion with any other person of the same name.

REMOVAL.

CHARLES HEISCH, F.C.S., Analytical and Consulting Chemist, Superintending Gas Examiner to the Corporation of London, &c., &c., has REMOVED from 8, Savage Gardens, to 79, MARK LANE, where he may be consulted as usual.

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THE GAS & WATER COMPANIES DIRECTORY, 1878.

(GAS SECTION.)

The Editor will feel greatly obliged if Secretaries and Engineers would fill up, and return to him at once, the forms sent them, as the work is now going to press. If any have not received Forms, they will be forwarded immediately, on application to the Editor,

CHARLES W. HASTINGS,
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ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

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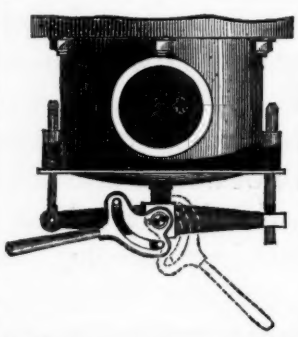

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A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in.,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
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Special attention given to the execution of Export Orders.

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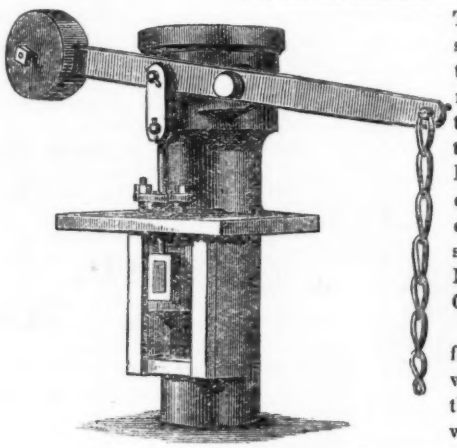

THE advantages of this Dip will be seen from the engraving. It is thoroughly effectual in its working, removing the whole of the pressure of the hydraulic main from the retort, thus causing a great saving in gas. It is very easy of manipulation, requiring little care and attention; it cannot get out of order, and, when shut, works as an ordinary Dip-Pipe. No accumulation of carbon in retort. Can be fixed to existing H-pipes.

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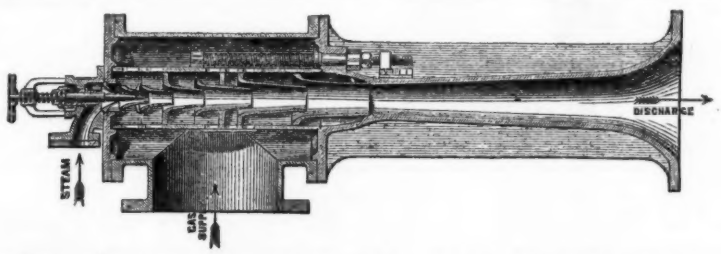

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By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

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The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
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A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

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WET AND DRY GAS-METERS,
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LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.

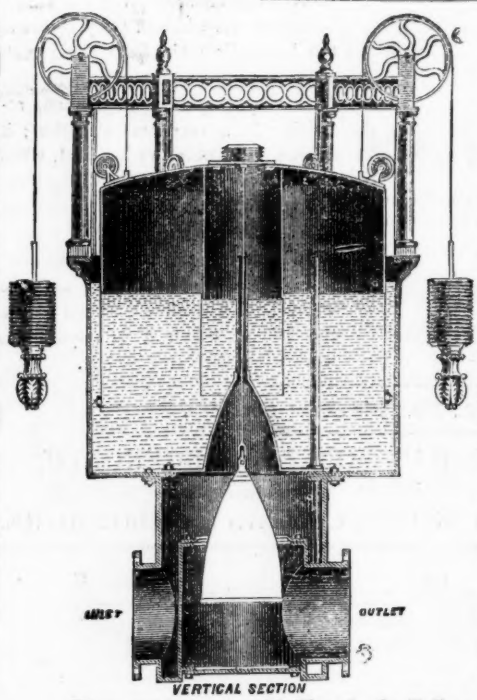
J. & J. BRADDOCK,

GLOBE METER-WORKS,
OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS
WITH TALC REFLECTORS AND SELF-ACTING VALVES
TO PREVENT DOWN-DRAUGHT;
VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.
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MEDIÆVAL CHURCH WORK AND CORONÆ
COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;
COLUMNS, BRACKETS, & STREET LANTERNS;
BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.
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(KENSINGTON PATTERN.)

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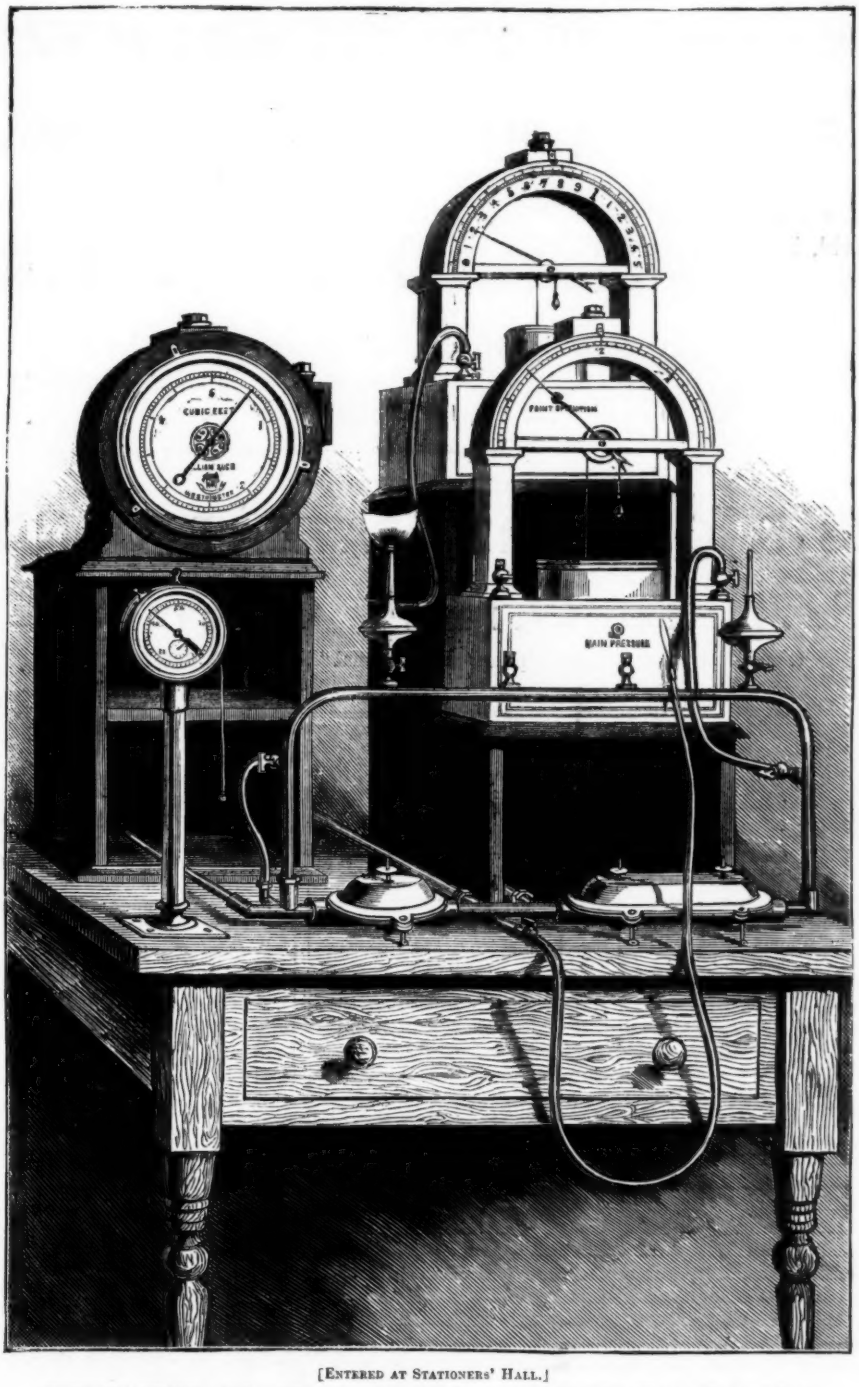
(SALFORD PATTERN.)



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SUGG'S IMPROVED PATENT PUBLIC LAMP GOVERNORS.
(DOUBLE REGULATION.)

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IMPROVED APPARATUS FOR TESTING
STREET-LAMP GOVERNORS.

PRICES COMPLETE, AS ABOVE, ON APPLICATION.

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SCRUBBERS, VALVES, EXHAUSTERS, IRON ROOFS, BRIDGES, BOILERS,

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GENERAL CAST AND WROUGHT IRON WORKS.

S. C. & Sons undertake the entire Erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the Supplying and Laying of MAINS.

They make a speciality of supplying every requisite whatever for a Gas-Work, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

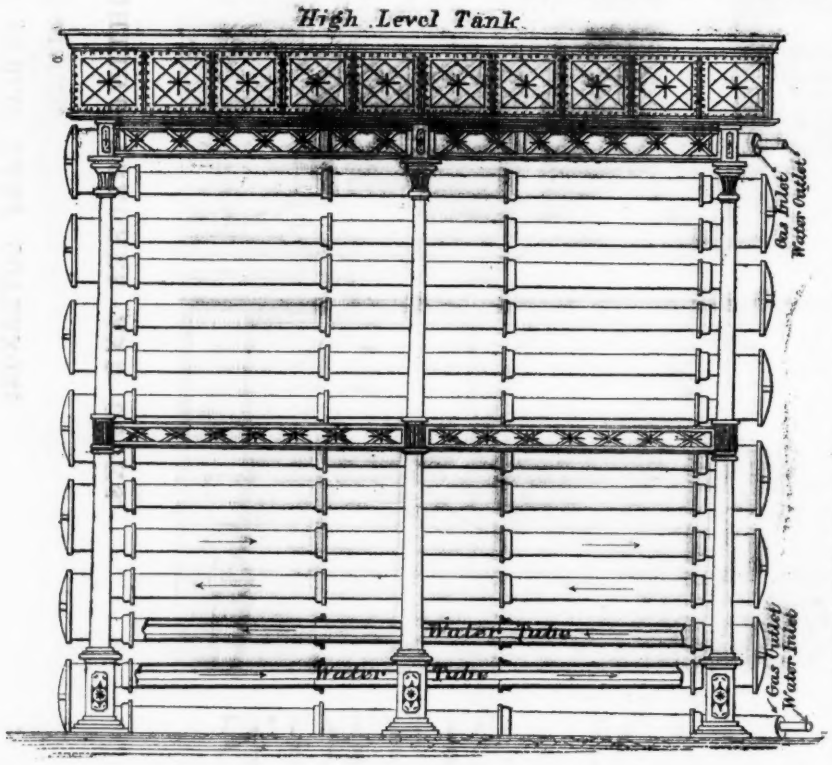
MANUFACTURERS OF

MORRIS & CUTLER'S PATENT CONDENSER

AND

CUTLER'S PATENT GAS-WASHER.

(For Illustration and Description, see "Journal" for the 2nd inst., page 588.)



Description of Morris & Cutler's Patent Condenser.

The Condenser may consist of pipes arranged in tiers as shown, or in any other form most convenient to the site available, each tier being connected with special connexions, and containing within same either one or more coils of smaller pipe through which water is passed, being supplied from any convenient source of supply, the water passing in an opposite direction to the gas, so that the coldest water is at the gas outlet. The power of the Condenser can be regulated precisely in proportion to the quantity of water allowed to pass through, which is not in any way contaminated, but simply heated by the hot gas, and advantage can be taken of its being at a high level to carry it to a high-level cistern, from whence it can be used for supply to boiler or any other purpose. (The Condenser itself may form the support for a high-level cistern as illustrated.) By an arrangement of valves the water may be shut off, and an air orifice opened, when air will pass through instead of water, or both air and water can be shut off. The power of the Condenser is, therefore, entirely under control.

The Condenser may be seen in operation at the Brentford Gas-Works.

For further Particulars, apply to

Mr. F. MORRIS, GAS-WORKS, BRENTFORD,

OR TO

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PROVIDENCE WORKS, MILLWALL (Near the Steamboat Pier), LONDON, E.

THE AMERICAN GAS-LIGHT JOURNAL.

A. M. CALLENDER & CO., Proprietors. G. WARREN DRESSER, Editor.

Issued Semi-Monthly at No. 42 Pine Street, New York City.

This Journal is especially devoted to Gas Engineering and Manufacture, and is the official organ of the AMERICAN GAS-LIGHT ASSOCIATION, and the NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

Subscriptions at $3.50 per annum, post paid, to Great Britain, may be made direct by forwarding Post Office Money Order or Draft to the above address. Rates of advertisement, $2.00 an inch. Special rates for larger spaces.

THE FARNLEY IRON COMPANY, LIMITED,

FARNLEY, near LEEDS,

MANUFACTURERS OF

FIRE-CLAY GAS-RETORTS & FIRE-BRICKS,

Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.

In order to meet the constantly increasing demand for their Gas-Retorts, the F. I. Co. have recently made such an addition to their premises as will enable them to execute expeditiously the largest home or foreign orders.

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" " Glazed Bricks: A. BARFIELD, 22, Great George Street, Westminster.

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IMPERIAL METER COMPANY,

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KING'S ROAD, LONDON, N.W.,

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MANUFACTURERS OF

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The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

THE

SILBER LIGHT COMPANY, LIMITED,

49, WHITECROSS STREET, LONDON, E.C.

MANUFACTURERS OF SILBER GAS-BURNERS & FITTINGS.

No. 285.

The Times says: "A considerable improvement upon any burners of the same kind that have hitherto been constructed."

Dr. W. WALLACE, F.R.S.E., F.C.S., says: "After a careful study of the principles of the Argand, I have come to the conclusion that your burner is the best at present known."

The Silber Tubulated Gas-Burner.

No. 291.

The *Lancet* says: "Mr. Silber has obtained a light of singular steadiness, whiteness, and illuminating power, with the great additional advantage of such perfect combustion as to preserve the purity of the atmosphere."

The manager of the gas-works at Southport says: "When our gas is 18 candles with the Standard burner, the Silber gives it as 22. You ought to get it noticed by the gas managers at once."

The Silber Tubulated Gas-Burner, with Opal Shade and Cup and Governor attached.

No. 286.

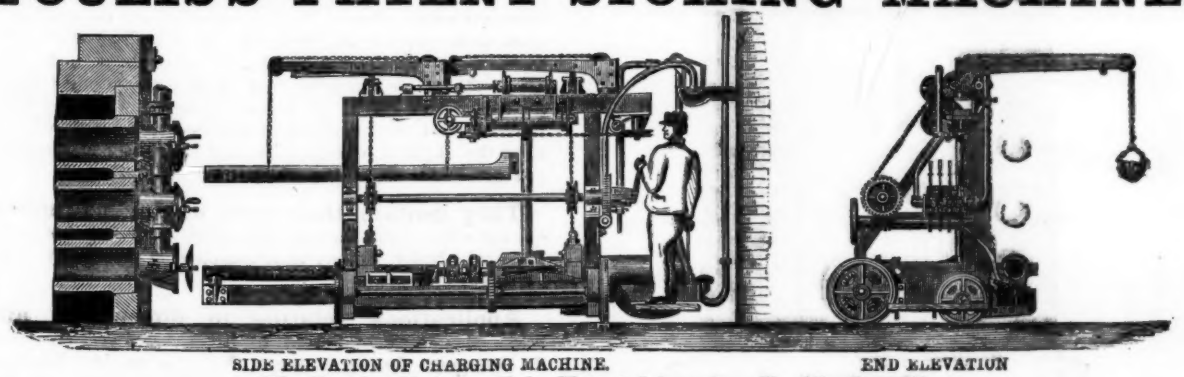
The Times says: "Besides the Argand burners, some improved Bat's-wing burners of different sizes were exhibited. In these there is an internal chamber permitting the expansion of the gas before it reaches the flame. They are constructed to burn from two to eight cubic feet of gas per hour, and the illumination they give ranges from 4 to 30 candles, a considerable improvement upon any burners of the same kind that have hitherto been constructed."

The Silber Bat's-wing Gas-Burner.

THE SILBER LIGHT COMPANY, LIMITED,

Are also Manufacturers of every description of Lamps for Railways, Ships, Streets, Churches, and Domestic Purposes.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

(*The Drawing Machine will be Illustrated in next week's Advertisement.*)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz;

Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

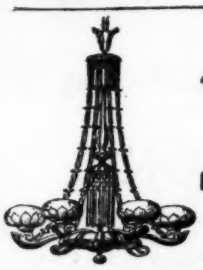
They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.



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BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

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WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

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PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

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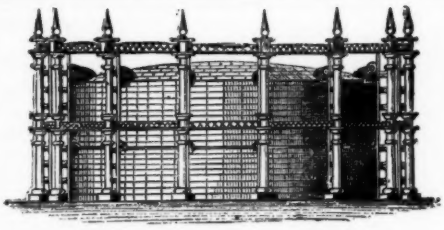
HOPE IRON WORKS,



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ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

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SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

NOTICE OF REMOVAL.

G. J. EVESON,

GAS COAL AND CANNEL CONTRACTOR,

Begs to intimate to his numerous connexion that, for the convenience of Gas Managers and others waiting upon him, he has removed from

89, HIGH STREET, STOURBRIDGE,

and that in future his HEAD OFFICES will be

123, NEW STREET, BIRMINGHAM,

Where all communications and inquiries should be addressed.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,594 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9868 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6*s.* per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

TO GAS COMPANIES.

GEORGE McKAIG,

MANUFACTURER OF

GAS-PURIFYING WOOD SIEVES,

153, CLEVELAND STREET,

DONCASTER.

It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.

CARRIAGE PAID.

BOUCK & CO., LIMITED,

TAR DISTILLERS & MANUFACTURING CHEMISTS,

MILES PLATTING, MANCHESTER.

BUYERS OF COAL TAR,

And Crude Products therefrom,

AMMONIACAL LIQUOR, &c.

GRIRDROD'S PATENT PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10*s.*

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3*s.* 6*d.*; gratis to ledger customers.

W. H. BAILEY & CO.,

Brassfounders, Gauge Injector and Tool Makers,

ALBION WORKS, SALFORD,

LANCASHIRE.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

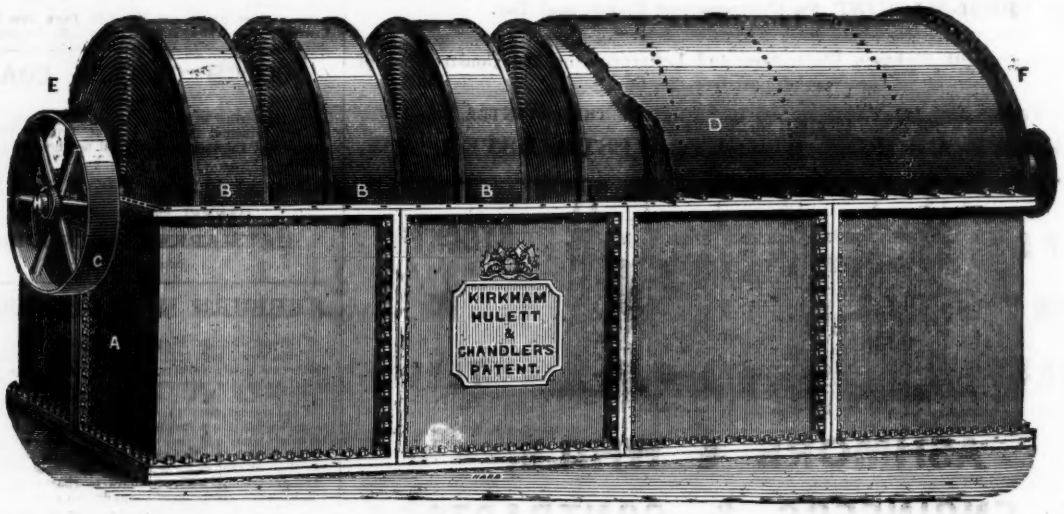
London Wharf: No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL: Back Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 1000 days, and are yet in good order. References on application.

July 2, 1877.

STANDARD WASHER AND SCRUBBER.



The advantages of the Apparatus will doubtless be understood by those interested in gas manufacture.

The principal points of any Apparatus for the extraction of ammonia may be summarily stated as follows:—

1. **A large amount of Surface is desirable.**
2. **Such Surface should be always effectually Wetted.**
3. **The Surfaces or Scrubbing Material should cause no Pressure.**
4. **The Gas should meet various strength Liquors on its course.**
5. **However small the quantity of Water used, it ought to operate over the whole Surface.**
6. **Changing Scrubbing Material is both Objectionable and Expensive.**
7. **Economy both as to Space occupied and Cost of Apparatus is an important item.**

All these requisitions are supplied by the above Apparatus, of which the following is an explanation:—

A is a cast-iron tank, formed into several separate water-tight compartments.

B B B volutes of sheet iron fitted to the centre shaft, which is driven by the pulley, C, and causing the said volutes to revolve each in a separate compartment filled with water or other fluid.

D, the cover, has partitions fitted into it corresponding with those in the tank, sufficient space being left between the top of the partition in the tank and the lower edge of that in the cover, to allow the gas a free passage through the first volute to the second, and so on to the third, fourth, &c.

The action is as follows:—The crude gas entering at E is partly washed in the first compartment, which becomes 10 or 12 oz. liquor, or stronger if required, according to the quantity allowed to enter per ton; the gas then passes to the second, where the liquor is of a less strength; thence into a weaker liquor, as it passes from one compartment to the other, finishing at the last compartment or outlet, F, with clean water, which is constantly flowing and running over from one compartment to another, until it reaches the last space, from which it flows from the outlet-pipe into the well or tank ready for sale or removal.

Taps are inserted in each compartment for the convenience of drawing liquor for testing, &c.

Applications as to Cost, &c., may be obtained of either

Mr. D. HULETT, 55 & 56, HIGH HOLBORN;

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER;

Or Messrs. CHANDLER, 104, NEWINGTON CAUSEWAY.

Inquirers will please state their Maximum Day Make.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

LIVESEY FIRE-CLAY WORKS.

NEAR BLACKBURN, LANCASHIRE.

(ESTABLISHED 1835.)

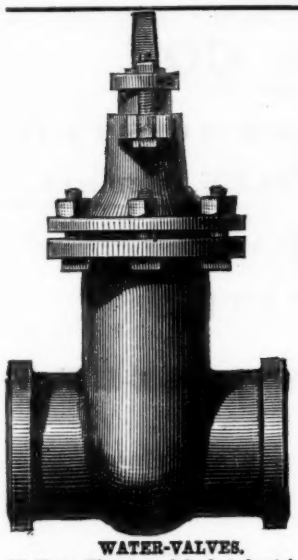
ORLANDO BROTHERS, LIMITED,

MANUFACTURERS OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS



WATER-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 1000 feethead.

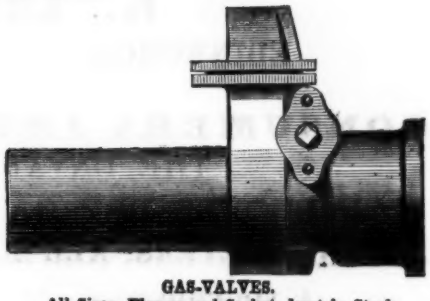
SIMPSON & COMPANY,

ENGINE-WORKS,

GROSVENOR ROAD, PIMLICO,

LONDON.

SCREW-COCKS, HYDRANTS,
SLUICES, PENSTOCKS,
And all other Machinery for
WORKS OF WATER SUPPLY, DRAINAGE AND IRRIGATION.



GAS-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 100 feet head.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.

NEW PATENT WET GAS-METER,

THE "RELIANCE,"

MANUFACTURED BY THE

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON; UNION STREET, OLDHAM; HANOVER STREET, DUBLIN.

The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON.

MR. A. VERNON HARCOURT'S COLOUR TESTS,

FOR BISULPHIDE OF CARBON, SULPHURETTED HYDROGEN, AND CARBONIC ACID IN COAL GAS.

The usual method by which the quantity of sulphur in coal gas is determined demands much time and considerable manipulative skill, as well as expensive apparatus. With Mr. Harcourt's Apparatus a test may be easily made by any intelligent person within a quarter of an hour, and the quantity of sulphur in any sample of gas ascertained within two or three grains per 100 cubic feet.

The Tests for Sulphuretted Hydrogen and for Carbonic Acid are equally simple.

THIS APPARATUS OUGHT TO BE POSSESSED BY EVERY GAS COMPANY.

Descriptive Particulars sent on receipt of 2d. in Stamps.

ALEXANDER WRIGHT & CO.,

GAS-METER AND APPARATUS MANUFACTURERS,

55, 55a, & 56, MILLBANK STREET, WESTMINSTER, LONDON, S.W.

F. W. HARTLEY, Manager.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW.

Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges,

Governors, Test Holders, &c., &c.

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JOHN ABBOT & CO., LIMITED,

MANUFACTURERS OF

IMPROVED

HYDRAULIC CRANES & HOISTS,

Effecting an IMMENSE SAVING in the cost of discharging Coals from Vessels, Barges, &c.

HYDRAULIC RAMS FOR LIFTING AND LOWERING PURIFIER COVERS.

GAS PLANT GENERALLY, PIPES, ROOFING, TANKS, &c.,

PARK WORKS, GATESHEAD.

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GLASGOW OFFICES: 54, ST. ENOCH'S SQUARE.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co. 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Oct. 16, 1877.